



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017,
ANSI/NCSL Z540-1-1994 & ANSI/NCSL Z540.3-2006

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CALIBRATION

Valid To: June 30, 2025

Certificate Number: 2357.22

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory at the location above as well as the four satellite locations listed below to perform the following calibrations^{1,8}:

I. Acoustical

Parameter/Equipment	Frequency	CMC ² (±)	Comments
Microphones Sensitivity – Class 1 & 2	250 Hz & 1 kHz (-80 to 0) dB	0.14 dB re 1.0 V/Pa	B&K 4228, B&K 4160, B&K 5936, Agilent 34401
Microphone Frequency Response – Class 1 & 2	3.15 Hz to 126 kHz (0 to 5) dB	0.15 dB	Agilent 33220A, 34401A
Acoustic Calibrators – Class 1 & 2			
Sound Pressure Level: (74, 84, 94, 104 & 114) dB	125 Hz to 4 kHz	0.11 dB	B&K 4228, B&K 5936, Agilent 34401
Frequency: SPL Re: 20 µPa	125 Hz to 4 kHz	0.015 Hz	

Parameter/Equipment	Frequency	CMC ² (±)	Comments
Sound Level Meters – Type 1 & 2 & Noise Dosimeters (Acoustical Portion- SPL) 94 dB, Re: 20 µPa 104 dB, Re: 20 µPa 114 dB, Re: 20 µPa	31.5 Hz 63 Hz 125 Hz 250 Hz 500 Hz 1 kHz 2 kHz 4 kHz 8 kHz 12 kHz 16 kHz	0.53 dB 0.36 dB 0.31 dB 0.26 dB 0.31 dB 0.31 dB 0.31 dB 0.36 dB 0.42 dB 0.47 dB 0.54 dB	B&K 4226
Piston Phones – Sound Pressure Level Frequency: SPL Re: 20 µPa	124 dB @ 250 Hz 250 Hz	0.11 dB 0.015 Hz	B&K 4228, HP 34401 B&K 5936 (4228 comparison method)
Sound Level Meters Type 1 (Electrical Portion)	125 Hz, 200 Hz, 250 Hz, 400 Hz, 630 Hz, 1 kHz, 1.6 kHz, 2.5 kHz, 3.15 kHz, 4 kHz, 5 kHz, 6.3 kHz, 8 kHz	0.011 dB	HP 34401A

II. Chemical Quantities

Parameter/Equipment	Range	CMC ^{2,9} (±)	Comments
pH – Measuring Equipment	(4, 7 & 10) pH ± 10 % pH	0.018 pH	pH buffer solutions

Parameter/Equipment	Range	CMC ^{2,9} (±)	Comments
Conductivity – Measuring Equipment ⁸	0.6 to 10 µS ± 10 % 100 µS ± 10 % 1000 µS ± 10 % 1411 µS ± 10 % 10 000 µS ± 10 % 100 000 µS ± 10 % 150 000 µS ± 10 % 200 000 µS ± 10 %	0.31 µS 0.84 µS 5.4 µS 4.6 µS 44 µS 0.35 mS 0.58 mS 0.63 mS	Conductivity buffer solutions

III. Dimensional

Parameter/Equipment	Range	CMC ^{2,5} (±)	Comments
Micrometers – Inside, Outside, & Depth ³	Up to 4 in (4 to 12) in (12 to 36) in	(10 + 1.9L) µin (17 + 4.3L) µin (51 + 1.9L) µin	Gage blocks w/ optical parallels
Flatness	Up to 1 in	4.9 µin	
Parallelism	Up to 1 in	25 µin	
Calipers ³	Up to 4 in (4 to 12) in (12 to 48) in	(30 + 1.0L) µin 290 µin (280 + 1.1L) µin	Gage blocks
Height Gages ³	(0.05 to 4) in (4 to 12) in (12 to 48) in	(92 + 0.25L) µin (86 + 2L) µin (90 + 1.7L) µin	Gage blocks w/ surface plate
Dial Indicators ³	Up to 1 in	21 µin	Super micrometer

IV. Electrical – DC / Low Frequency

Parameter/Equipment	Range	CMC ^{2,4} (±)	Comments
DC Voltage – Generate & Measure ³	Up to 100 mV (0.1 to 1) V	1.7 μV/V 1.6 μV/V	Fluke 732B w/752A 720A dividers
	(1 to 10) V (10 to 100) V (100 to 1000) V (1000 to 1100) V	1.5 μV/V 1.6 μV/V 1.6 μV/V 4.4 μV/V	
DC Voltage – Generate ³	0 V	0.21 nV	Copper short
Fixed Point	(0 to 220) mV (0.22 to 2.2) V (2.2 to 11) V (11 to 22) V (22 to 220) V (220 to 1100) V	7.6 μV/V + 0.39 μV 4.8 μV/V + 0.62 μV 3.1 μV/V + 2.3 μV 3.2 μV/V + 3.9 μV 1.7 μV/V + 39 μV 6.3 μV/V + 390 μV	Fluke 5720A/5725A
	100 mV 1 V 1.018 V 10 V 100 V 1000 V 1100 V	1.5 μV 1.5 μV 1.5 μV 1.0 μV 1.7 μV 1.8 μV 4.4 μV/V	732B w/ 720A, 752A 34420A, 5720A
DC Voltage – Measure ³	Up to 200 mV (0.2 to 2) V (2 to 20) V (20 to 200) V (0.200 to 1) kV	6.0 μV/V + 93 nV 3.6 μV/V + 0.39 μV 3.6 μV/V + 3.9 μV 5.5 μV/V + 39 μV 5.5 μV/V + 490 mV	Fluke 8508A opt 01
Fixed Point	Up to 120 kV	1.2 mV/V	Ross VD120-6.2Y
	10 V 1.018 V 1.000 V	0.33 μV/V 1.5 μV/V 1.5 μV/V	Data proof scanner w/ 734A & Agilent 34420A
DC Current – Generate ³	Up to 220 μA 220 μA to 2.2 mA (2.2 to 22) mA (22 to 220) mA 220 mA to 2.2 A (2.2 to 11) A	40 μA/A + 5.4 nA 32 μA/A + 6.2 nA 32 μA/A + 39 nA 39 μA/A + 0.62 μA 70 μA/A + 12 μA 0.28 mA/A + 0.37 mA	Fluke 5720A Fluke 5720A/5725A

Parameter/Equipment	Range	CMC ^{2,4} (\pm)	Comments
DC Current – Generate ³ (cont)	(1.1 to 3) A (3 to 11) A (11 to 20.5) A	0.30 mA/A + 31 μ A 0.39 mA/A + 0.39 mA 0.78 mA/A + 0.58 mA	Fluke 5520
Clamp-On Only	(16.5 to 149.999) A (150 to 1025) A	3.9 mA/A + 0.11 mA 4 mA/A + 0.39 mA	Fluke 5520A w/ coil
DC Current – Generate & Measure ³	0 A (0 to 100) nA (0.1 to 1) μ A (1 to 10) μ A (10 to 100) μ A (100 to 200) μ A (0.1 to 1) mA (1 to 2) mA (2 to 10) mA (10 to 20) mA (20 to 100) mA (100 to 200) mA 200 mA to 1 A (1 to 2) A (2 to 10) A (10 to 20) A (20 to 100) A (100 to 300) A	4.0 pA 13 μ A/A 13 μ A/A 6.3 μ A/A 4.1 μ A/A 4.2 μ A/A 3.9 μ A/A 4.2 μ A/A 4.7 μ A/A 5.8 μ A/A 5.7 μ A/A 6.2 μ A/A 6.1 μ A/A 14 μ A/A 6.1 μ A/A 33 μ A/A 0.10 mA/A 0.50 mA/A	Reference open, standard resistors & 8508A Y5020, 8508A, 9211
DC Resistance – Generate, Fixed Points	0.1 Ω 1 Ω 10 Ω 100 Ω 1 k Ω 10 k Ω 100 k Ω 1 M Ω 10 M Ω 100 M Ω 1 G Ω	7.6 $\mu\Omega/\Omega$ 1.9 $\mu\Omega/\Omega$ 3.1 $\mu\Omega/\Omega$ 2.7 $\mu\Omega/\Omega$ 3.2 $\mu\Omega/\Omega$ 2.0 $\mu\Omega/\Omega$ 12 $\mu\Omega/\Omega$ 2.2 $\mu\Omega/\Omega$ 7.3 $\mu\Omega/\Omega$ 14 $\mu\Omega/\Omega$ 0.16 m Ω/Ω	Standard resistors Fluke 8508A 7000K

Parameter/Equipment	Range	CMC ^{2,4} (±)	Comments		
DC Resistance – Measure & Generate	(0.01 to 0.1) mΩ	22 μΩ/Ω	MI 6010B range extenders & standard resistors		
	(0.1 to 1) mΩ	2.2 μΩ/Ω			
	(0.001 to 0.1) Ω	0.27 μΩ/Ω			
	(0.1 to 10) Ω	(0.1 to 10) Ω	0.17 μΩ/Ω	MI 6010B & standard resistors	
		(>10 to 100) Ω	0.23 μΩ/Ω		
		(>100 to 1000) Ω	0.27 μΩ/Ω		
		(>1 to 10) kΩ	0.29 μΩ/Ω		
	>10 to 100) kΩ	>10 to 100) kΩ	0.42 μΩ/Ω	MI 6000B & standard resistors	
		>100 kΩ to 1 MΩ	0.60 μΩ/Ω		
		(>1 to 10) MΩ	0.80 μΩ/Ω		
		(>10 to 100) MΩ	2.3 μΩ/Ω		
		100 MΩ to 1 GΩ	10 μΩ/Ω		
DC Resistance – Measure & Generate ³	0 Ω	6.4 μΩ 90 nΩ	Fluke 8508A open Fluke 8508A short		
	(2 to 20) MΩ	0.30 mΩ/Ω	Guideline 6520A		
	(20 to 200) MΩ	0.19 mΩ/Ω			
	200 MΩ to 2 GΩ	0.26 mΩ/Ω			
	(2 to 20) GΩ	0.73 mΩ/Ω			
	(20 to 200) GΩ	0.97 mΩ/Ω			
	200 GΩ to 2 TΩ	1.3 mΩ/Ω			
	(2 to 20) TΩ	4.1 mΩ/Ω			
	(20 to 200) TΩ	7.5 mΩ/Ω			
	DC Resistance – Measure ³	(0 to 2) Ω		21 μΩ/Ω + 4.0 μΩ	Fluke 8508A: true ohms mode
		(2 to 20) Ω		15 μΩ/Ω + 14 μΩ	
(20 to 200) Ω		12 μΩ/Ω + 50 μΩ	8508A normal mode		
(0.2 to 2) kΩ		11 μΩ/Ω + 0.50 mΩ			
(2 to 20) kΩ		9.2 μΩ/Ω + 5.0 mΩ			
(2 to 200) kΩ		12 μΩ/Ω + 50 mΩ			
(0.2 to 2) MΩ		17 μΩ/Ω + 1.0 Ω	8508A high voltage mode		
(2 to 20) MΩ		20 μΩ/Ω + 10 Ω			
(20 to 200) MΩ		77 μΩ/Ω + 1.0 kΩ			
(0.2 to 2) GΩ		0.22 mΩ/Ω + 0.10 MΩ			
(2 to 20) GΩ	1.5 mΩ/Ω + 10 MΩ				

Parameter/Equipment	Range	CMC ^{2, 4, 6} (\pm)	Comments	
DC Resistance – Generate ³	0 Ω	90 n Ω	Copper short Fluke 5720A	
	1 Ω	0.11 m Ω		
	1.9 Ω	0.16 m Ω		
	10 Ω	0.21 m Ω		
	19 Ω	0.41 m Ω		
	100 Ω	0.96 m Ω		
	190 Ω	1.8 m Ω		
	1 k Ω	8.6 m Ω		
	1.9 k Ω	16 m Ω		
	10 k Ω	80 m Ω		
	19 k Ω	0.15 Ω		
	100 k Ω	1.2 Ω		
	190 k Ω	2.2 Ω		
	1 M Ω	20 Ω		
	1.9 M Ω	38 Ω		
	10 M Ω	0.37 k Ω		
	19 M Ω	0.84 k Ω		
	100 M Ω	12 k Ω		
	(1 to 100) M Ω	1.2 m Ω / Ω		Biddle 72-6346-1
	(0.1 to 1) G Ω	2.5 m Ω / Ω		
	(1 to 10) G Ω	5.8 m Ω / Ω		
	(10 to 100) G Ω	17 m Ω / Ω		
	(0 to 10.9999) Ω	33 $\mu\Omega$ / Ω + 0.78 m Ω	Fluke 5520A	
	(11 to 32.9999) Ω	24 $\mu\Omega$ / Ω + 1.2 m Ω		
	(33 to 109.9999) Ω	22 $\mu\Omega$ / Ω + 1.1 m Ω		
	(110 to 329.9999) Ω	23 $\mu\Omega$ / Ω + 1.6 m Ω		
	(0.33 to 1.099 999) k Ω	22 $\mu\Omega$ / Ω + 1.6 m Ω		
	(1.1 to 3.299 99) k Ω	23 $\mu\Omega$ / Ω + 16 m Ω		
	(3.3 to 10.999 99) k Ω	23 $\mu\Omega$ / Ω + 16 m Ω		
	(11 to 32.999 99) k Ω	23 $\mu\Omega$ / Ω + 0.16 Ω		
	(33 to 109.9999) k Ω	23 $\mu\Omega$ / Ω + 0.16 Ω		
	(110 to 329.9999) k Ω	26 $\mu\Omega$ / Ω + 1.6 Ω		
	(0.33 to 1.099 999) M Ω	26 $\mu\Omega$ / Ω + 1.6 Ω		
(1.1 to 3.299 999) M Ω	48 $\mu\Omega$ / Ω + 23 Ω			
(3.3 to 10.999 99) M Ω	0.10 m Ω / Ω + 39 Ω			
(11 to 32.999 99) M Ω	0.21 m Ω / Ω + 1.9 k Ω			
(33 to 109.9999) M Ω	0.40 m Ω / Ω + 2.3 k Ω			
(110 to 329.9999) M Ω	2.3 m Ω / Ω + 78 k Ω			
(330 to 1100) M Ω	12 m Ω / Ω + 390 k Ω			
DC Power – Generate ³	(0.01 to 337) W	0.24 mW/W	Fluke 5520A	
	(0.33 to 3.06) kW	0.17 mW/W		
	(3.06 to 20.91) kW	0.56 mW/W		

Parameter/Equipment	Range	CMC ^{2,4} (±)	Comments
DC Current – Measure ³	Up to 100 µA (100 to 200) µA 200 µA to 2 mA (2 to 20) mA (20 to 200) mA 200 mA to 2 A (2 to 20) A (1 to 20) A (20 to 1000) A	13 µA/A + 0.40 nA 13 µA/A + 0.4 nA 14 µA/A + 4.0 nA 14 µA/A + 40 nA 48 µA/A + 0.80 µA 0.18 mA/A + 16 µA 0.41 mA/A + 0.40 mA 0.17 mA/A 3.0 mA/A	Fluke 8508A opt 01 Fluke Y5020 w/ HP 3458A w/ current shunts
DC Resistance – Measure ³	Up to 2 Ω (2 to 20) Ω (20 to 200) Ω (0.2 to 2) kΩ (2 to 20) kΩ (20 to 200) kΩ (0.2 to 2) MΩ (2 to 20) MΩ (20 to 200) MΩ	3.1 µΩ/Ω 0.28 µΩ/Ω 0.41 µΩ/Ω 0.41 µΩ/Ω 0.53 µΩ/Ω 0.66 µΩ/Ω 1.1 µΩ/Ω 2.4 µΩ/Ω 10 µΩ/Ω	Fluke 8508A opt 1 – transfer method
DC Resistance – Measure ³	Up to 2 Ω (2 to 20) Ω (20 to 200) Ω 200 Ω to 2 kΩ (2 to 20) kΩ (20 to 200) kΩ 200 kΩ to 2 MΩ (2 to 20) MΩ (20 to 200) MΩ 200 MΩ to 2 GΩ	22 µΩ/Ω + 5.0 µΩ 11 µΩ/Ω + 18 µΩ 8.7 µΩ/Ω + 60 µΩ 8.7 µΩ/Ω + 0.60 mΩ 8.8 µΩ/Ω + 6.0 mΩ 9.1 µΩ/Ω + 60 mΩ 12 µΩ/Ω + 1.2 Ω 25 µΩ/Ω + 0.12 kΩ 0.14 mΩ/Ω + 12 kΩ 1.6 mΩ/Ω + 1.2 MΩ	Fluke 8508A opt 01

Parameter/Range	Frequency	CMC ^{2,4} (±)	Comments
AC Voltage – Generate & Measure ³ 2 mV	1 kHz 20 kHz 50 kHz 100 kHz 300 kHz 500 kHz 1 MHz 40 Hz 20 Hz 10 Hz	0.90 µV 1.0 µV 0.98 µV 1.4 µV 2.0 µV 2.9 µV 4.1 µV 0.93 µV 0.94 µV 1.0 µV	Fluke 5720A & 5790A characterized w/ 792A

Parameter/Range	Frequency	CMC ^{2,4} (±)	Comments
AC Voltage – Generate & Measure ³ (cont)			
3 mV	45 Hz	1.5 µV	Fluke 5720A & 5790A characterized w/ 792A
	10 kHz	1.5 µV	
10 mV	1 kHz	1.0 µV	
	20 kHz	1.0 µV	
	100 kHz	4.4 µV	
	300 kHz	9.5 µV	
20 mV	1 kHz	1.6 µV	
	20 kHz	1.7 µV	
	50 kHz	2.1 µV	
	100 kHz	3.2 µV	
	300 kHz	4.8 µV	
	500 kHz	6.9 µV	
	1 MHz	8.5 µV	
	40 Hz	1.5 µV	
20 Hz	20 Hz	1.6 µV	
	10 Hz	1.9 µV	
30 mV	9.5 Hz	25 µV	
	10 Hz	3.5 µV	
	45 Hz	2.3 µV	
	1 kHz	2.3 µV	
	10 kHz	2.3 µV	
	20 kHz	2.5 µV	
	50 kHz	4.9 µV	
	100 kHz	8.4 µV	
	450 kHz	23 µV	
33 mV	45 Hz	3.1 µV	
	10 kHz	3.1 µV	
100 mV	20 Hz	3.4 µV	
	55 Hz	2.4 µV	
	1 kHz	2.5 µV	
	3 kHz	2.6 µV	
	10 kHz	2.4 µV	
	20 kHz	3.2 µV	
	30 kHz	7.6 µV	
	60 kHz	15 µV	
	100 kHz	16 µV	
	300 kHz	24 µV	



Parameter/Range	Frequency	CMC ^{2,4} (±)	Comments
AC Voltage – Generate & Measure ³ (cont)			
200 mV	1 kHz	4.2 μV	Fluke 5720A & 5790A characterized w/ 792A
	20 kHz	5.9 μV	
	50 kHz	7.8 μV	
	100 kHz	11 μV	
	300 kHz	17 μV	
	500 kHz	24 μV	
	1 MHz	48 μV	
	40 Hz	5.3 μV	
	20 Hz	7.8 μV	
	10 Hz	13 μV	
300 mV	9.5 Hz	0.24 mV	
	10 Hz	19 μV	
	45 Hz	11 μV	
	1 kHz	9.6 μV	
	10 kHz	9.9 μV	
	20 kHz	11 μV	
	50 kHz	18 μV	
	100 kHz	26 μV	
	500 kHz	90 μV	
0.33 V	45 Hz	17 μV	
	10 kHz	21 μV	
1 V	20 Hz	21 μV	
	55 Hz	29 μV	
	1 kHz	21 μV	
	3 kHz	21 μV	
	10 kHz	20 μV	
	20 kHz	20 μV	
	30 kHz	37 μV	
	60 kHz	74 μV	
	100 kHz	56 μV	
	300 kHz	0.13 mV	
	500 kHz	0.20 mV	
	1 MHz	0.70 mV	

Parameter/Range	Frequency	CMC ^{2,4} (±)	Comments
AC Voltage – Generate & Measure ³ (cont)			
2 V	1 kHz	24 µV	Fluke 5720A & 5790A characterized w/ 792A
	20 kHz	23 µV	
	50 kHz	24 µV	
	100 kHz	33 µV	
	300 kHz	57 µV	
	500 kHz	78 µV	
	1 MHz	0.20 mV	
	40 Hz	23 µV	
	20 Hz	45 µV	
	10 Hz	0.13 mV	
	2.3 V	1 kHz	
3 V	9.5 Hz	2.4 mV	
	10 Hz	1.9 mV	
	45 Hz	90 µV	
	1 kHz	67 µV	
	10 kHz	72 µV	
	20 kHz	67 µV	
	50 kHz	0.12 mV	
	100 kHz	0.20 mV	
	450 kHz	1.0 mV	
3.3 V	45 Hz	0.19 mV	
	10 kHz	0.18 mV	
10 V	10 Hz	0.28 mV	
	20 Hz	0.18 mV	
	40 Hz	0.11 mV	
	55 Hz	0.28 mV	
	1 kHz	0.24 mV	
	3 kHz	0.24 mV	
	10 kHz	0.24 mV	
	20 kHz	0.23 mV	
	30 kHz	0.42 mV	
	50 kHz	0.42 mV	
	60 kHz	0.67 mV	
	100 kHz	0.68 mV	
	300 kHz	1.5 mV	
	500 kHz	3.1 mV	
	1 MHz	9.4 mV	

Parameter/Range	Frequency	CMC ^{2,4} (±)	Comments
AC Voltage – Generate & Measure ³ (cont)			
19 V	1 kHz	0.40 mV	Fluke 5720A & 5790A characterized w/ 792A
20 V	1 kHz	0.23 mV	
	20 kHz	0.22 mV	
	50 kHz	0.23 mV	
	100 kHz	0.31 mV	
	300 kHz	0.53 mV	
	500 kHz	0.80 mV	
	1 MHz	6.3 mV	
	40 Hz	0.25 mV	
20 Hz	0.36 mV		
10 Hz	0.55 mV		
2.3 V	1 kHz	35 µV	
3 V	9.5 Hz	2.4 mV	
	10 Hz	1.9 mV	
	45 Hz	90 µV	
	1 kHz	67 µV	
	10 kHz	72 µV	
	20 kHz	67 µV	
	50 kHz	0.12 mV	
	100 kHz	0.20 mV	
	450 kHz	1.0 mV	
3.3 V	45 Hz	0.19 mV	
	10 kHz	0.18 mV	
10 V	10 Hz	0.28 mV	
	20 Hz	0.18 mV	
	40 Hz	0.11 mV	
	55 Hz	0.28 mV	
	1 kHz	0.24 mV	
	3 kHz	0.24 mV	
	10 kHz	0.24 mV	
	20 kHz	0.23 mV	
	30 kHz	0.42 mV	
	50 kHz	0.42 mV	

Parameter/Range	Frequency	CMC ^{2,4} (±)	Comments
AC Voltage – Generate & Measure ³ (cont)			
10 V	60 kHz	0.67 mV	Fluke 5720A & 5790A characterized w/ 792A
	100 kHz	0.68 mV	
	300 kHz	1.5 mV	
	500 kHz	3.1 mV	
	1 MHz	9.4 mV	
19 V	1 kHz	0.40 mV	
30 V	9.5 Hz	24 mV	
	10 Hz	1.8 mV	
	45 Hz	0.99 mV	
	1 kHz	0.84 mV	
	10 kHz	0.82 mV	
	20 kHz	0.83 mV	
	50 kHz	1.4 mV	
	90 kHz	2.3 mV	
33 V	45 Hz	1.1 mV	
	10 kHz	1.6 mV	
100 V	20 Hz	1.9 mV	
	55 Hz	1.6 mV	
	1 kHz	1.4 mV	
	3 kHz	2.6 mV	
	10 kHz	2.6 mV	
	20 kHz	2.6 mV	
	30 kHz	5.5 mV	
	50 kHz	5.4 mV	
	60 kHz	7.9 mV	
	100 kHz	7.8 mV	
200 V	1 kHz	2.7 mV	
	20 kHz	2.8 mV	
	50 kHz	2.9 mV	
	100 kHz	4.5 mV	
	40 Hz	3.1 mV	
	20 Hz	5.5 mV	
	10 Hz	7.6 mV	

Parameter/Range	Frequency	CMC ^{2,4} (±)	Comments
AC Voltage – Generate & Measure ³ (cont)			
300 V	45 Hz	11 mV	Fluke 5720A & 5790A characterized w/ 792A
	1 kHz	11 mV	
	10 kHz	11 mV	
	18 kHz	11 mV	
	50 kHz	18 mV	
330 V	45 Hz	13 mV	
	10 kHz	12 mV	
500 V	50 Hz	19 mV	
	1 kHz	17 mV	
	3 kHz	17 mV	
	10 kHz	17 mV	
	30 kHz	17 mV	
700 V	1 kHz	27 mV	
1000 V	45 Hz	16 mV	
	50 Hz	48 mV	
	300 Hz	48 mV	
	1 kHz	17 mV	
	5 kHz	40 mV	
	8 kHz	35 mV	
	30 kHz	22 mV	
1020 V	1 kHz	35 mV	
	8 kHz	63 mV	
AC Voltage – Measure ³			
Up to 2.2 mV	(1 to 10) Hz	0.64 mV/V + 14 μV	Fluke 8508A, Fluke 5790A
	(10 to 20) Hz	1.3 mV/V + 1.0 μV	
	(20 to 40) Hz	0.58 mV/V + 1.0 μV	
	40 Hz to 20 kHz	0.34 mV/V + 1.0 μV	
	(20 to 50) kHz	0.63 mV/V + 1.6 μV	
	(50 to 100) kHz	0.94 mV/V + 2.5 μV	
	(100 to 300) kHz	1.8 mV/V + 3.1 μV	
	(300 to 500) kHz	1.9 mV/V + 6.2 μV	
	(0.5 to 1) MHz	2.7 mV/V + 6.2 μV	

Parameter/Range	Frequency	CMC ^{2,4} (±)	Comments
AC Voltage – Measure ³ (cont)			
(2.2 to 7) mV	(1 to 10) Hz (10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz (0.5 to 1) MHz	0.64 mV/V + 14 μV 0.66 mV/V + 1.0 μV 0.29 mV/V + 1.0 μV 0.17 mV/V + 1.0 μV 0.31 mV/V + 1.6 μV 0.47 mV/V + 2.5 μV 0.95 mV/V + 3.1 μV 1.0 mV/V + 6.2 μV 1.6 mV/V + 6.2 μV	Fluke 8508A, Fluke 5790A
(7 to 22) mV	(1 to 10) Hz (10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz (0.5 to 1) MHz	0.64 mV/V + 14 μV 0.23 mV/V + 1.0 μV 0.16 mV/V + 1.0 μV 94 μV/V + 1.0 μV 0.17 mV/V + 1.6 μV 0.25 mV/V + 2.5 μV 0.65 mV/V + 3.1 μV 0.73 mV/V + 6.2 μV 1.4 mV/V + 6.2 μV	
(22 to 70) mV	(1 to 10) Hz (10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz (0.5 to 1) MHz	0.64 mV/V + 14 μV 0.19 mV/V + 1.0 μV 0.10 mV/V + 1.0 μV 60 μV/V + 1.0 μV 0.11 mV/V + 1.6 μV 0.22 mV/V + 2.5 μV 0.42 mV/V + 3.1 μV 0.56 mV/V + 6.2 μV 0.90 mV/V + 6.2 μV	
(70 to 220) mV	(1 to 10) Hz (10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz (0.5 to 1) MHz	0.64 mV/V + 14 μV 0.17 mV/V + 1.0 μV 72 μV/V + 1.0 μV 33 μV/V + 1.0 μV 59 μV/V + 1.6 μV 0.13 mV/V + 2.5 μV 0.21 mV/V + 3.1 μV 0.31 mV/V + 6.2 μV 0.80 mV/V + 6.2 μV	

Parameter/Range	Frequency	CMC ^{2,4} (±)	Comments
AC Voltage – Measure ³ (cont)			
(220 to 700) mV	(1 to 10) Hz (10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz (0.5 to 1) MHz	0.93 mV/V + 0.12 mV 0.16 mV/V + 1.0 μV 62 μV/V + 1.0 μV 27 μV/V + 1.0 μV 40 μV/V + 1.6 μV 63 μV/V + 2.5 μV 0.14 mV/V + 3.1 μV 0.23 mV/V + 6.2 μV 0.75 mV/V + 6.2 μV	Fluke 8508A, Fluke 5790A
(0.7 to 2.2) V	(1 to 10) Hz (10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz (0.5 to 1) MHz	0.93 mV/V + 0.12 mV 0.16 mV/V 55 μV/V 20 μV/V 36 μV/V 56 μV/V 0.13 mV/V 0.20 mV/V 0.70 mV/V	
(2.2 to 7) V	(1 to 10) Hz (10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz (0.5 to 1) MHz	0.69 mV/V + 1.2 mV 0.16 mV/V 56 μV/V 20 μV/V 39 μV/V 65 μV/V 0.15 mV/V 0.31 mV/V 0.93 mV/V	
(7 to 22) V	(1 to 10) Hz (10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz (0.5 to 1) MHz	0.69 mV/V + 1.2 mV 0.16 mV/V 56 μV/V 23 μV/V 42 μV/V 67 μV/V 0.15 mV/V 0.31 mV/V 0.93 mV/V	

Parameter/Range	Frequency	CMC ^{2,4} (±)	Comments
AC Voltage – Measure ³ (cont)			
(22 to 70) V	(1 to 10) Hz (10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz (0.5 to 1) MHz	0.82 mV/V + 12 mV 0.16 mV/V 56 μV/V 26 μV/V 45 μV/V 74 μV/V 0.16 mV/V 0.32 mV/V 0.93 mV/V	Fluke 8508A, Fluke 5790A
(70 to 220) V	(1 to 10) Hz (10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz (0.5 to 1) MHz	0.82 mV/V + 12 mV 0.16 mV/V 57 μV/V 26 μV/V 54 μV/V 78 μV/V 0.16 mV/V 0.39 mV/V 10 mV/V + 2.0 mV	
(220 to 700) V	(1 to 10) Hz (10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz	0.15 mV/V + 70 mV 0.16 mV/V 78 μV/V 34 μV/V 0.10 mV/V 0.39 mV/V	
(700 to 1050) V	(1 to 10) Hz (10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz	0.15 mV/V + 70 mV 0.16 mV/V 79 μV/V 35 μV/V 0.10 mV/V 0.39 mV/V	Fluke 5790A wideband
Wideband Up to 2.2 mV	(0.5 to 1.2) MHz (1.2 to 2) MHz (2 to 10) MHz (10 to 20) MHz (20 to 30) MHz	0.61 mV/V + 0.78 μV 0.97 mV/V + 0.78 μV 1.6 mV/V + 0.78 μV 2.9 mV/V + 0.78 μV 5.8 mV/V + 0.78 μV	Note: uncertainty of wideband is for flatness relative to 1 kHz

Parameter/Range	Frequency	CMC ^{2,4} (±)	Comments
AC Voltage – Measure ³ (cont)			
Wideband (2.2 to 7) mV	(0.5 to 1.2) MHz (1.2 to 2) MHz (2 to 10) MHz (10 to 20) MHz (20 to 30) MHz	0.58 mV/V + 0.78 μV 0.71 mV/V + 0.78 μV 1.1 mV/V + 0.78 μV 2.2 mV/V + 0.78 μV 3.4 mV/V + 0.78 μV	Fluke 5790A wideband Note: uncertainty of wideband is for flatness relative to 1 kHz
(7 to 22) mV	(0.5 to 1.2) MHz (1.2 to 2) MHz (2 to 10) MHz (10 to 20) MHz (20 to 30) MHz	0.58 mV/V 0.71 mV/V 1.1 mV/V 2.2 mV/V 3.4 mV/V	
(22 to 70) mV	(0.5 to 1) MHz (1.2 to 2) MHz (2 to 10) MHz (10 to 20) MHz (20 to 30) MHz	0.45 mV/V 0.60 mV/V 1.1 mV/V 2.1 mV/V 3.3 mV/V	
(70 to 220) mV	(0.5 to 1) MHz (1.2 to 2) MHz (2 to 10) MHz (10 to 20) MHz (20 to 30) MHz	0.43 mV/V 0.60 mV/V 1.1 mV/V 2.1 mV/V 3.3 mV/V	
(220 to 700) mV	(0.5 to 1) MHz (1.2 to 2) MHz (2 to 10) MHz (10 to 20) MHz (20 to 30) MHz	0.43 mV/V 0.60 mV/V 1.1 mV/V 2.1 mV/V 3.2 mV/V	
(0.7 to 2.2) V	(0.5 to 1) MHz (1.2 to 2) MHz (2 to 10) MHz (10 to 20) MHz (20 to 30) MHz	0.43 mV/V 0.59 mV/V 1.1 mV/V 2.1 mV/V 3.2 mV/V	

Parameter/Range	Frequency	CMC ^{2,4} (\pm)	Comments
AC Voltage – Measure ³ (cont) Wideband (2.2 to 7) V	(0.5 to 1) MHz (1.2 to 2) MHz (2 to 10) MHz (10 to 20) MHz (20 to 30) MHz	0.43 mV/V 0.59 mV/V 1.1 mV/V 1.2 mV/V 2.7 mV/V	Fluke 5790A wideband Note: uncertainty of wideband is for flatness relative to 1 kHz
AC Voltage – Generate ³ (0.2 to 2.2) mV	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz (0.5 to 1) MHz	0.79 mV/V + 4.0 μ V 0.76 mV/V + 4.0 μ V 0.81 mV/V + 4.0 μ V 1.1 mV/V + 4.0 μ V 1.4 mV/V + 5.0 μ V 2.3 mV/V + 10 μ V 3.3 mV/V + 20 μ V 5.0 mV/V + 20 μ V	Fluke 5720A
(2.2 to 22) mV	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz (0.5 to 1) MHz	0.25 mV/V + 4.0 μ V 0.12 mV/V + 4.0 μ V 0.11 mV/V + 4.0 μ V 0.25 mV/V + 4.0 μ V 0.54 mV/V + 5.0 μ V 1.1 mV/V + 10 μ V 1.4 mV/V + 20 μ V 2.8 mV/V + 20 μ V	
(22 to 220) mV	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz (0.5 to 1) MHz	0.38 mV/V + 12 μ V 92 μ V/V + 7.0 μ V 81 μ V/V + 7.0 μ V 0.20 mV/V + 7.0 μ V 0.47 mV/V + 17 μ V 0.87 mV/V + 20 μ V 1.3 mV/V + 25 μ V 2.6 mV/V + 45 μ V	

Parameter/Range	Frequency	CMC ^{2,4} (±)	Comments
AC Voltage – Generate ³ (cont)			
(0.22 to 2.2) V	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz (0.5 to 1) MHz	0.52 mV/V + 40 µV 88 µV/V + 15 µV 46 µV/V + 8.0 µV 77 µV/V + 10 µV 0.14 mV/V + 30 µV 0.44 mV/V + 80 µV 0.94 mV/V + 0.20 mV 1.6 mV/V + 0.30 mV	Fluke 5720A
(2.2 to 22) V	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz (0.5 to 1) MHz	0.39 mV/V + 0.40 mV 93 µV/V + 0.15 mV 46 µV/V + 50 µV 77 µV/V + 0.10 mV 0.10 mV/V + 0.20 mV 0.27 mV/V + 0.60 mV 0.94 mV/V + 2.0 mV 1.6 mV/V + 3.2 mV	
(22 to 220) V	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz (0.5 to 1) MHz	0.46 mV/V + 4.0 mV 88 µV/V + 1.5 mV 55 µV/V + 0.60 mV 0.11 mV/V + 1.0 mV 0.18 mV/V + 2.5 mV 0.95 mV/V + 16 mV 4.2 mV/V + 40 mV 8.6 mV/V + 80m V	
(220 to 250) V	(15 to 50) Hz	0.28 mV/V + 16 mV	
(220 to 1100) V	(0.05 to 1) kHz	72 µV/V + 3.5 mV	
(0.22 to 1.1) kV	40 Hz to 1 kHz (1 to 20) kHz (20 to 30) kHz	77 µV/V + 3.5 mV 0.11 mV/V + 4.7 mV 0.32 mV/V + 8.5 mV	Fluke 5720/5725A
(220 to 750) V	(30 to 50) kHz (50 to 100) kHz	0.34 mV/V + 8.5 mV 1.1 mV/V + 35 mV	

Parameter/Range	Frequency	CMC ^{2,4} (±)	Comments	
AC Voltage – Generate ³ (cont)				
Wideband Option: Absolute				
Up to 1.1 mV	30 Hz to 500 kHz	6.4 mV/V + 1.6 μV	Fluke 5700-3 wideband	
(1.1 to 3) mV	30 Hz to 500 kHz	5.5 mV/V + 2.3 μV		
(3 to 11) mV	30 Hz to 500 kHz	5.5 mV/V + 6.2 μV		
(11 to 33) mV	30 Hz to 500 kHz	4.7 mV/V + 12 μV		
(33 to 110) mV	30 Hz to 500 kHz	4.7 mV/V + 31 μV		
(110 to 300) mV	30 Hz to 500 kHz	3.9 mV/V + 78 μV		
330 mV to 1.1 V	30 Hz to 500 kHz	3.9 mV/V + 0.31 mV		
(1.1 to 3.5) V	30 Hz to 500 kHz	3.1 mV/V + 0.39 mV		
Wideband Option: Flatness				
Up to 1.1 mV	(10 to 30) Hz	2.4 mV/V		Fluke 5700-3 wideband
	30 Hz to 120 kHz	0.98 mV/V		
	(0.12 to 2) MHz	2.2 mV/V + 2.3 μV		
	(2 to 10) MHz	3.7 mV/V + 2.3 μV		
	(10 to 20) MHz	5.5 mV/V + 2.3 μV		
	(20 to 30) MHz	13 mV/V + 12 μV		
(1.1 to 3) mV	(10 to 30) Hz	2.4 mV/V		
	30 Hz to 120 kHz	0.94 mV/V		
	(0.12 to 2) MHz	1.3 mV/V + 2.3 μV		
	(2 to 10) MHz	2.2 mV/V + 2.3 μV		
	(10 to 20) MHz	4.9 mV/V + 2.3 μV		
	(20 to 30) MHz	13 mV/V + 2.3 μV		
(3 to 11) mV	(10 to 30) Hz	2.4 mV/V	Fluke 5700-3 wideband	
	30 Hz to 120 kHz	0.94 mV/V		
	(0.12 to 2) MHz	1.1 mV/V + 2.3 μV		
	(2 to 10) MHz	2 mV/V + 2.3 μV		
	(10 to 20) MHz	3.9 mV/V + 2.3 μV		
	(20 to 30) MHz	8.6 mV/V + 2.3 μV		
(11 to 33) mV	(10 to 30) Hz	2.4 mV/V		
	30 Hz to 120 kHz	0.91 mV/V		
	(0.12 to 2) MHz	1 mV/V + 2.3 μV		
	(2 to 10) MHz	2 mV/V + 2.3 μV		
	(10 to 20) MHz	3.8 mV/V + 2.3 μV		
	(20 to 30) MHz	8.5 mV/V + 2.3 μV		



Parameter/Range	Frequency	CMC ^{2,4} (±)	Comments
AC Voltage – Generate ³ (cont)			
Wideband Option: Flatness (33 to 110) mV	(10 to 30) Hz 30 Hz to 120 kHz (0.12 to 2) MHz (2 to 10) MHz (10 to 20) MHz (20 to 30) MHz	2.4 mV/V 0.87 mV/V 1 mV/V + 2.3 μV 2 mV/V + 2.3 μV 3.8 mV/V + 2.3 μV 8.1 mV/V + 2.3 μV	Fluke 5700-3 wideband
(110 to 330) mV	(10 to 30) Hz 30 Hz to 120 kHz (0.12 to 2) MHz (2 to 10) MHz (10 to 20) MHz (20 to 30) MHz	2.3 mV/V 0.84 mV/V 1 mV/V + 2.3 μV 2 mV/V + 2.3 μV 3.8 mV/V + 2.3 μV 8.5 mV/V + 2.3 μV	
330 mV to 1.1 V	(10 to 30) Hz 30 Hz to 120 kHz (0.12 to 2) MHz (2 to 10) MHz (10 to 20) MHz (20 to 30) MHz	2.3 mV/V 0.84 mV/V 1 mV/V + 2.3 μV 2 mV/V + 2.3 μV 3.8 mV/V + 2.3 μV 8.5 mV/V + 2.3 μV	
(1.1 to 3.5) V	(10 to 30) Hz 30 Hz to 120 kHz (0.12 to 2) MHz (2 to 10) MHz (10 to 20) MHz (20 to 30) MHz	2.3 mV/V 0.84 mV/V 1 mV/V + 2.3 μV 2 mV/V + 2.3 μV 3.8 mV/V + 2.3 μV 8.5 mV/V + 2.3 μV	
AC Voltage – Measure ³			
Up to 200 mV	(1 to 10) Hz (10 to 40) Hz (40 to 100) Hz (0.1 to 2) kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz	0.35 mV/V + 14 μV 0.16 mV/V + 4.0 μV 0.12 mV/V + 4.0 μV 0.12 mV/V + 2.0 μV 0.14 mV/V + 4.0 μV 0.35 mV/V + 8.0 μV 0.77 mV/V + 20 μV	Fluke 8508A opt 01

Parameter/Range	Frequency	CMC ^{2,4} (±)	Comments
AC Voltage – Measure ³ (cont)			
(0.2 to 2) V	(1 to 10) Hz (10 to 40) Hz (40 to 100) Hz (0.1 to 2) kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz (100 to 300) kHz (0.3 to 1) MHz	0.50 mV/V + 0.12 mV 0.12 mV/V + 20 μV 0.11 mV/V + 20 μV 79 μV/V + 20 μV 0.11 mV/V + 20 μV 0.23 mV/V + 40 μV 0.59 mV/V + 0.20 mV 3 mV/V + 2.0 mV 10 mV/V + 20 mV	Fluke 8508A opt 01
(2 to 20) V	(1 to 10) Hz (10 to 40) Hz (40 to 100) Hz (0.1 to 2) kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz (100 to 300) kHz (0.3 to 1) MHz	0.36 mV/V + 1.2 mV 0.13 mV/V + 0.20 mV 95 μV/V + 0.20 mV 85 μV/V + 0.20 mV 0.11 mV/V + 0.20 mV 0.22 mV/V + 0.40 mV 0.58 mV/V + 2.0 mV 3.0 mV/V + 20 mV 10 mV/V + 0.20 V	
(20 to 200) V	(1 to 10) Hz (10 to 40) Hz (40 to 100) Hz (0.1 to 2) kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz (100 to 300) kHz (0.3 to 1) MHz	0.43 mV/V + 12 mV 0.13 mV/V + 2.0 mV 98 μV/V + 2.0 mV 83 μV/V + 2.0 mV 0.12 mV/V + 2.0 mV 0.22 mV/V + 4.0 mV 0.58 mV/V + 20 mV 1.6 mV/V + 0.20 V 5.2 mV/V + 2.0 V	
(0.10 to 1.05) kV	(1 to 10) Hz (10 to 40) Hz (0.01 to 10) kHz (10 to 30) kHz (30 to 100) kHz	0.50 mV/V + 10 mV 0.13 mV/V + 20 mV 0.13 mV/V + 20 mV 0.38 mV/V + 40 mV 0.66 mV/V + 0.20 V	
Up to 85 kV	60 Hz	14 mV/V	Ross 120 kV divider

Parameter/Range	Frequency	CMC ^{2, 4, 6} (±)	Comments
AC/DC Difference –			
Fixed Points @ 2 mV	10 Hz	0.049 %	Fluke 5720A w/ 792A & 8508A
	20 Hz	0.048 %	
	40 Hz	0.048 %	
	100 Hz	0.050 %	
	1 kHz	0.050 %	
	10 kHz	0.048 %	
	20 kHz	0.049 %	
	50 kHz	0.047 %	
	100 kHz	0.064 %	
	300 kHz	0.079 %	
	500 kHz	0.093 %	
	800 kHz	0.11 %	
	1 MHz	0.11 %	
Fixed Points @ 6 mV	10 Hz	0.033 %	
	20 Hz	0.033 %	
	100 Hz	0.025 %	
	1 kHz	0.025 %	
	10 kHz	0.025 %	
	20 kHz	0.025 %	
	50 kHz	0.033 %	
	100 kHz	0.044 %	
	300 kHz	0.063 %	
	500 kHz	0.074 %	
	1 MHz	0.092 %	
Fixed Points @ 10 mV	10 Hz	0.013 %	
	20 Hz	0.011 %	
	40 Hz	0.012 %	
	100 Hz	0.011 %	
	1 kHz	0.011 %	
	10 kHz	0.012 %	
	20 kHz	0.011 %	
	50 kHz	0.013 %	
	100 kHz	0.022 %	
	300 kHz	0.033 %	
	500 kHz	0.043 %	
	800 kHz	0.049 %	
	1 MHz	0.055 %	

Parameter/Range	Frequency	CMC ^{2, 4, 6} (±)	Comments
AC/DC Difference – (cont)			
Fixed Points @ 20 mV	10 Hz	0.015 %	Fluke 5720A w/792A & 8508A
	20 Hz	0.013 %	
	40 Hz	0.012 %	
	100 Hz	0.010 %	
	1 kHz	0.010 %	
	10 kHz	0.010 %	
	20 kHz	0.010 %	
	50 kHz	0.012 %	
	100 kHz	0.022 %	
	300 kHz	0.034 %	
	500 kHz	0.047 %	
	800 kHz	0.057 %	
	1 MHz	0.056 %	
Fixed Points @ 60 mV	10 Hz	0.0063 %	
	20 Hz	0.0055 %	
	40 Hz	0.0048 %	
	100 Hz	0.0040 %	
	1 kHz	0.0025 %	
	10 kHz	0.0025 %	
	20 kHz	0.0037 %	
	50 kHz	0.0037 %	
	100 kHz	0.0061 %	
	300 kHz	0.012 %	
	500 kHz	0.018 %	
	800 kHz	0.028 %	
	1 MHz	0.028 %	
Fixed Points @ 200 mV	10 Hz	0.0040 %	
	20 Hz	0.0032 %	
	40 Hz	0.0019 %	
	100 Hz	0.0018 %	
	1 kHz	0.0018 %	
	10 kHz	0.0019 %	
	20 kHz	0.0020 %	
	50 kHz	0.0031 %	
	100 kHz	0.0061 %	
	300 kHz	0.011 %	
	500 kHz	0.017 %	
	800 kHz	0.025 %	
	1 MHz	0.028 %	

Parameter/Range	Frequency	CMC ^{2, 4, 6} (±)	Comments
AC/DC Difference – (cont)			
Fixed Points @ 600 mV	10 Hz	0.0039 %	Fluke 5720A w/ 792A & 8508A
	20 Hz	0.0028 %	
	40 Hz	0.0026 %	
	100 Hz	0.0011 %	
	1 kHz	0.000 93 %	
	10 kHz	0.000 93 %	
	20 kHz	0.0011 %	
	50 kHz	0.0011 %	
	100 kHz	0.0018 %	
	300 kHz	0.0039 %	
	500 kHz	0.0046 %	
	800 kHz	0.0086 %	
	1 MHz	0.0094 %	
Fixed Points @ 1 V & 2 V	10 Hz	0.0039 %	
	20 Hz	0.0031 %	
	40 Hz	0.0026 %	
	100 Hz	0.0011 %	
	1 kHz	0.0008 %	
	10 kHz	0.0013 %	
	20 kHz	0.0015 %	
	50 kHz	0.0016 %	
	100 kHz	0.0018 %	
	300 kHz	0.0031 %	
	500 kHz	0.0042 %	
	800 kHz	0.0053 %	
	1 MHz	0.0067 %	
Fixed Points @ 6 V	10 Hz	0.0039 %	
	20 Hz	0.0031 %	
	40 Hz	0.0026 %	
	100 Hz	0.0011 %	
	1 kHz	0.000 77 %	
	10 kHz	0.000 82 %	
	20 kHz	0.000 83 %	
	50 kHz	0.0011 %	
	100 kHz	0.0011 %	
	300 kHz	0.0032 %	
	500 kHz	0.0043 %	
	800 kHz	0.0047 %	
	1 MHz	0.0065 %	

Parameter/Range	Frequency	CMC ^{2,4,6} (±)	Comments
AC/DC Difference – (cont)			
Fixed Points @ 10 V & 20 V	10 Hz	0.0039 %	Fluke 5720A w/ 792A & 8508A
	20 Hz	0.0031 %	
	40 Hz	0.0026 %	
	100 Hz	0.0011 %	
	1 kHz	0.000 92 %	
	10 kHz	0.000 94 %	
	20 kHz	0.000 94 %	
	50 kHz	0.0011 %	
	100 kHz	0.0015 %	
	300 kHz	0.0031 %	
	500 kHz	0.0040 %	
	800 kHz	0.0054 %	
	1 MHz	0.0063 %	
Fixed Points @ 60 V	10 Hz	0.0038 %	
	20 Hz	0.0031 %	
	40 Hz	0.0028 %	
	100 Hz	0.0011 %	
	1 kHz	0.000 93 %	
	10 kHz	0.000 93 %	
	20 kHz	0.000 95 %	
	50 kHz	0.0013 %	
	100 kHz	0.0016 %	
	300 kHz	0.0047 %	
Fixed Points @ 100 V	10 Hz	0.0039 %	
	20 Hz	0.0031 %	
	40 Hz	0.0028 %	
	100 Hz	0.0011 %	
	1 kHz	0.000 93 %	
	10 kHz	0.0010 %	
	20 kHz	0.0011 %	
	50 kHz	0.0014 %	
	100 kHz	0.0025 %	
	Fixed Points @ 200 V	10 Hz	
20 Hz		0.0032 %	
40 Hz		0.0029 %	
100 Hz		0.0014 %	
1 kHz		0.0012 %	
10 kHz		0.0012 %	
20 kHz		0.0012 %	
50 kHz		0.0016 %	
100 kHz		0.0025 %	

Parameter/Range	Frequency	CMC ^{2,4,6} (±)	Comments
AC/DC Difference – (cont)			
Fixed Points @ 600 V	10 Hz 20 Hz 40 Hz 100 Hz 1 kHz 10 kHz 20 kHz 50 kHz 100 kHz	0.0062 % 0.0032 % 0.0029 % 0.0016 % 0.0013 % 0.0013 % 0.0013 % 0.0020 % 0.0047 %	Fluke 5720A w/ 792A & 8508A
Fixed Points @ 1000 V	40 Hz 100 Hz 1 kHz 10 kHz 20 kHz	0.0032 % 0.0029 % 0.0026 % 0.0026 % 0.0028 %	
AC Current – Generate ³			
(0 to 220) µA	(10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.042 % + 16 nA 0.023 % + 10 nA 0.021 % + 8 nA 0.032 % + 12 nA 0.10 % + 65 nA	Fluke 5720A
(0.22 to 2.2) mA	(10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.044 % + 40 nA 0.033 % + 35 nA 0.031 % + 35 nA 0.035 % + 0.11 µA 0.10 % + 0.65 µA	
(2.2 to 22) mA	(10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.035 % + 0.40 µA 0.017 % + 0.35 µA 0.013 % + 0.35 µA 0.020 % + 0.55 µA 0.10 % + 5.0 µA	
(22 to 220) mA	(10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.036 % + 4.0 µA 0.017 % + 3.5 µA 0.013 % + 2.5 µA 0.020 % + 3.5 µA 0.10 % + 10 µA	

Parameter/Range	Frequency	CMC ^{2,4,6} (±)	Comments
AC Current – Generate ³			
(0.22 to 2.2) A	20 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.027 % + 35 µA 0.047 % + 80 µA 0.63 % + 160 mA	Fluke 5720A
(2.2 to 11) A	40 Hz to 1 kHz (0.1 to 1) kHz (1 to 5) kHz	0.37 mA/A + 0.17 mA 0.76 mA/A + 0.17 mA 2.8 mA/A + 0.17 mA	Fluke 5720A/5725A
(1.1 to 3) A	(10 to 45) Hz (0.045 to 1) kHz (1 to 5) kHz (5 to 10) kHz	0.14 % + 0.08 mA 0.048 % + 0.08 mA 0.47 % + 0.08 mA 2.0 % + 4.0 mA	Fluke 5520A
(3 to 11) A	(45 to 100) Hz (0.1 to 1) kHz (1 to 5) kHz	0.047 % + 1.6 mA 0.078 % + 1.6 mA 2.3 % + 1.6 mA	
(11 to 20.5) A	(45 to 100) Hz (0.1 to 1) kHz (1 to 5) kHz	0.093 % + 4.0 mA 0.12 % + 4.0 mA 2.3 % + 4.0 mA	
Toroidal Type Clamps			
(16.5 to 150) A	(45 to 65) Hz (65 to 440) Hz	0.31 % 0.81 %	Fluke 5520A w/coil
(150 to 1025) A	(45 to 65) Hz (65 to 440) Hz	0.33 % 0.82 %	
AC Voltage – Generate & Measure			
(0 to 2.2) mV	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz (0.5 to 1.2) MHz (1.2 to 2) MHz (2 to 10) MHz (10 to 20) MHz (20 to 30) MHz	0.032 % 0.032 % 0.031 % 0.031 % 0.041 % 0.051 % 0.061 % 0.098 % 0.098 % 0.18 % 0.28 % 0.64 %	Fluke 792A, 5720A, 5790A, 8½ digit DMM



Parameter/Range	Frequency	CMC ^{2, 4, 6} (±)	Comments		
AC Voltage – Generate & Measure (cont)	(2.2 to 7) mV	(10 to 20) Hz	0.023 %	Fluke 792A, 5720A, 5790A, 8½ digit DMM	
		(20 to 40) Hz	0.023 %		
		40 Hz to 20 kHz	0.019 %		
		(20 to 50) kHz	0.022 %		
		(50 to 100) kHz	0.029 %		
		(100 to 300) kHz	0.041 %		
		(300 to 500) kHz	0.047 %		
		(0.5 to 1.2) MHz	0.069 %		
		(1.2 to 2) MHz	0.069 %		
		(2 to 10) MHz	0.098 %		
		(10 to 20) MHz	0.16 %		
		(20 to 30) MHz	0.33 %		
		(7 to 22) mV	(10 to 20) Hz		0.011 %
			(20 to 40) Hz		0.0099 %
			40 Hz to 20 kHz		0.0099 %
			(20 to 50) kHz		0.011 %
			(50 to 100) kHz		0.016 %
			(100 to 300) kHz		0.023 %
			(300 to 500) kHz		0.031 %
			(0.5 to 1.2) MHz		0.057 %
			(1.2 to 2) MHz		0.057 %
			(2 to 10) MHz		0.087 %
			(10 to 20) MHz		0.15 %
			(20 to 30) MHz		0.31 %
		(22 to 70) mV	(10 to 20) Hz		0.01 %
			(20 to 40) Hz		0.0087 %
			40 Hz to 20 kHz		0.0085 %
			(20 to 50) kHz		0.0086 %
			(50 to 100) kHz		0.011 %
			(100 to 300) kHz		0.016 %
			(300 to 500) kHz		0.022 %
			(0.5 to 1.2) MHz		0.043 %
			(1.2 to 2) MHz		0.043 %
			(2 to 10) MHz		0.085 %
			(10 to 20) MHz		0.13 %
			(20 to 30) MHz		0.30 %
		(70 to 220) mV	(10 to 20) Hz		0.0084 %
			(20 to 40) Hz		0.0082 %
			40 Hz to 20 kHz		0.0079 %
			(20 to 50) kHz		0.0081 %
		(50 to 100) kHz	0.0088 %		
		(100 to 300) kHz	0.011 %		
		(300 to 500) kHz	0.014 %		
		(0.5 to 1.2) MHz	0.042 %		
		(1.2 to 2) MHz	0.042 %		
		(2 to 10) MHz	0.084 %		
		(10 to 20) MHz	0.13 %		
		(20 to 30) MHz	0.30 %		

Parameter/Range	Frequency	CMC ^{2, 4, 6} (±)	Comments	
AC Voltage – Generate & Measure (cont)	(220 to 700) mV	(10 to 20) Hz	0.018 %	Fluke 792A, 5720A, 5790A, 8½ digit DMM
		(20 to 40) Hz	0.016 %	
		40 Hz to 20 kHz	0.0081 %	
		(20 to 50) kHz	0.0081 %	
		(50 to 100) kHz	0.014 %	
		(100 to 300) kHz	0.014 %	
		(300 to 500) kHz	0.014 %	
		(0.5 to 1.2) MHz	0.042 %	
		(1.2 to 2) MHz	0.042 %	
		(2 to 10) MHz	0.083 %	
		(10 to 20) MHz	0.13 %	
	(20 to 30) MHz	0.30 %		
	(0.7 to 2.2) V	(10 to 20) Hz	0.026 %	
		(20 to 40) Hz	0.020 %	
		40 Hz to 20 kHz	0.0076 %	
		(20 to 50) kHz	0.0076 %	
		(50 to 100) kHz	0.013 %	
		(100 to 300) kHz	0.013 %	
		(300 to 500) kHz	0.017 %	
		(0.5 to 1.2) MHz	0.042 %	
		(1.2 to 2) MHz	0.042 %	
		(2 to 10) MHz	0.083 %	
		(10 to 20) MHz	0.13 %	
	(20 to 30) MHz	0.30 %		
	(2.2 to 7) V	(10 to 20) Hz	0.016 %	
		(20 to 40) Hz	0.015 %	
		40 Hz to 20 kHz	0.0071 %	
		(20 to 50) kHz	0.0072 %	
		(50 to 100) kHz	0.013 %	
		(100 to 300) kHz	0.013 %	
		(300 to 500) kHz	0.013 %	
		(0.5 to 1.2) MHz	0.042 %	
		(1.2 to 2) MHz	0.042 %	
		(2 to 10) MHz	0.083 %	
		(10 to 20) MHz	0.13 %	
	(20 to 30) MHz	0.30 %		
	(7 to 22) V	(10 to 20) Hz	0.004 %	
		(20 to 40) Hz	0.0034 %	
		40 Hz to 20 kHz	0.0010 %	
		(20 to 50) kHz	0.0011 %	
		(50 to 100) kHz	0.0016 %	
		(100 to 300) kHz	0.0032 %	
(300 to 500) kHz		0.0039 %		
500 kHz to 1 MHz		0.024 %		
(22 to 70 V)	(10 to 20) Hz	0.0038 %		
	(20 to 40) Hz	0.0027 %		
	40 Hz to 20 kHz	0.0012 %		
	(20 to 50) kHz	0.0014 %		
	(50 to 100) kHz	0.0018 %		
	(100 to 300) kHz	0.0031 %		

Parameter/Range	Frequency	CMC ^{2, 4, 6} (±)	Comments
AC Voltage – Generate & Measure (cont)			
(70 to 220) V	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz	0.0054 % 0.0028 % 0.0020 % 0.0019 % 0.0026 %	Fluke 792A, 5720A, 5790A, 8½ digit DMM
(220 to 700) V	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz	0.0047 % 0.0029 % 0.0019 % 0.0026 % 0.0061 %	
(700 to 1050) V	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz	0.0046 % 0.0027 % 0.0022 % 0.0029 % 0.0057 %	
AC Current – Measure ³			
Up to 200 µA	(1 to 10) Hz (0.10 to 10) kHz (10 to 30) kHz (30 to 100) kHz	0.032 % + 24 nA 0.038 % + 24 nA 0.072 % + 24 nA 0.34 % + 24 nA	Fluke 8508A opt 01
(0.2 to 2) mA	(1 to 10) Hz (0.10 to 10) kHz (10 to 30) kHz (30 to 100) kHz	0.032 % + 0.24 µA 0.034 % + 0.24 µA 0.074 % + 0.24 µA 0.34 % + 0.24 µA	
(2 to 20) mA	(1 to 10) Hz (0.10 to 10) kHz (10 to 30) kHz (30 to 100) kHz	0.032 % + 2.4 µA 0.033 % + 2.4 µA 0.069 % + 2.4 µA 0.41 % + 2.4 µA	
(20 to 200) mA	(1 to 10) Hz (10 to 30) kHz (30 to 100) kHz	0.032 % + 24 µA 0.031 % + 24 µA 0.074 % + 24 µA	
(0.2 to 2) A	(10 to 20) Hz (45 to 100) Hz (0.1 to 5) kHz	0.062 % + 0.24 mA 0.075 % + 0.24 mA 0.25 % + 0.24 mA	
(2 to 20 A)	10 Hz to 2 kHz (2 to 10) kHz	0.078 % + 2.4 mA 0.28 % + 2.4 mA	
Up to 20 A	50 Hz to 1 kHz (1 to 5) kHz	0.31 mA/A 0.44 mA/A	

Parameter/Range	Frequency	CMC ^{2,4} (±)	Comments	
AC Current – Measure & Generate ³				
33 µA	(1 to < 10) kHz (10 to < 30) kHz 30 kHz	5.0 nA 5.1 nA 7.5 nA	Fluke 5790A w/ metal film resistors	
190 µA	45 Hz to 10 kHz (> 10 to 30) kHz	18 nA 22 nA		
200 µA	(10 to 40) Hz	26 nA		
329 µA	10 Hz 45 Hz to 10 kHz 30 kHz	76 nA 40 nA 26 nA		
1.9 mA	(1 to 20) kHz 30 kHz	0.19 µA 0.28 µA		
2.0 mA	(10 to 40) Hz	16 µA		
3.29 mA	10 Hz 45 Hz to 5 kHz (10 to 30) kHz	0.77 µA 0.40 µA 0.54 µA		
Up to 33 µA	(1 to 30) kHz	0.86 mA/A		Fluke 5720A characterized w/ 5790A & AC shunts
(33 to 200) µA	(10 to 20) Hz (20 to 40) Hz 40 Hz to 10 kHz	82 µA/A 52 µA/A 49 µA/A		
(200 to 329.99) µA	10 Hz to 10 kHz (10 to 30) kHz	0.25 mA/A 0.34 mA/A		
300 µA	(1 to 30) kHz	0.29 mA/A		
(0.33 to 2) mA	(10 to 20) Hz (20 to 40) Hz 40 Hz to 10 kHz (10 to 30) kHz	77 µA/A 69 µA/A 86 µA/A 0.16 mA/A		
(2 to 3.29) mA	(10 to 40) Hz 40 Hz to 10 kHz	0.21 mA/A 0.15 mA/A		
3.3 mA	(1 to 30) kHz	0.15 mA/A		

Parameter/Range	Frequency	CMC ^{2,4} (±)	Comments
AC Current – Measure & Generate ³ (cont)			
(3.3 to 20) mA	(10 to 40) Hz (20 to 40) Hz 40 Hz to 10 kHz (10 to 30) kHz	64 µA/A 57 µA/A 58 µA/A 65 µA/A	Fluke 5720A characterized w/ 5790A & AC shunts
(5 to 26) mA	(30 to 50) kHz	94 µA/A	
(20 to 32.9) mA	(10 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 30) kHz	65 µA/A 65 µA/A 66 µA/A 0.23 mA/A	
33 mA	(1 to 30) kHz	0.14 mA/A	
(33 to 200) mA	(10 to 20) Hz (20 to 40) Hz 40 Hz to 10 kHz (10 to 30) kHz	69 µA/A 57 µA/A 56 µA/A 0.33 mA/A	
(50 to 260) mA	(30 to 50) kHz	97 µA/A	
(200 to 329.99) mA	(10 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 30) kHz	0.10 mA/A 83 µA/A 70 µA/A 0.20 mA/A	
330 mA	(1 to 30) kHz	0.13 mA/A	
(125 to 650) mA	(30 to 50) kHz	0.10 mA/A	
(0.33 to 2) A	(10 to 40) Hz 40 Hz to 10 kHz	70 µA/A 68 µA/A	
(0.5 to 2.6) A	(10 to 20) kHz (20 to 50) kHz	68 µA/A 0.15 mA/A	
(2 to 2.999 99) A	(10 to 45) Hz 45 Hz to 5 kHz (5 to 10) kHz	0.12 mA/A 0.18 mA/A 0.33 mA/A	

Parameter/Range	Frequency	CMC ^{2,4,6} (±)	Comments
AC Current – Measure & Generate ³ (cont)			
3.3 mA	500 Hz to 5 kHz	0.17 mA/A	Fluke 5720A characterized w/ 5790A & AC shunts
(1.25 to 6) A	(5 to 20) kHz (20 to 50) kHz	73 µA/A 0.13 mA/A	
(3.3 to 10.9999) A	(10 to 500) Hz (0.5 to 1) kHz (1 to 5) kHz	0.13 mA/A 0.16 mA/A 0.37 mA/A	
(2.5 to 13) A	(5 to 20) kHz (20 to 50) kHz	82 µA/A 0.15 mA/A	
(10.9999 to 20.5) A	(10 to 500) Hz (0.5 to 1) kHz (1 to 5) kHz	0.19 mA/A 0.20 mA/A 0.49 mA/A	
(5 to 20) A	(5 to 20) kHz (20 to 50) kHz	0.18 mA/A 0.24 mA/A	
(20 to 30) A	50 Hz to 5 kHz	0.22 mA/A	
(30 to 50) A	50 Hz to 2 kHz	0.19 mA/A	
(50 to 80) A	50 Hz to 1 kHz	0.18 mA/A	
(80 to 90) A	(50 to 500) Hz	0.35 mA/A	
AC Resistance – Measure ³			
10 Ω to 100 kΩ	1 kHz	0.027 %	GenRad 1689M

Parameter/Range	Frequency	CMC ^{2,4} (\pm)	Comments
AC Resistance – Generate ³			
10 Ω	DC to 1 MHz (1 to 2) MHz (2 to 3) MHz (3 to 4) MHz (4 to 5) MHz (5 to 10) MHz (10 to 13) MHz	4 m Ω 5 m Ω 5 m Ω 6 m Ω 7 m Ω 20 m Ω 40 m Ω	Keysight 42030A standard resistor
100 Ω	DC to 1 MHz (1 to 2) MHz (2 to 3) MHz (3 to 4) MHz (4 to 5) MHz (5 to 10) MHz (10 to 13) MHz	40 m Ω 40 m Ω 46 m Ω 46 m Ω 43 m Ω 83 m Ω 93 m Ω	
1 k Ω	DC to 3 MHz (3 to 5) MHz (5 to 10) MHz (10 to 13) MHz	0.32 Ω 0.51 Ω 2 Ω 3 Ω	
10 k Ω	DC to 1 MHz	3.2 Ω	
100 k Ω	DC to 1 MHz	45 Ω	
AC Power – Generate ³ @ (45 to 65) Hz: PF=1			
(33 to 330) mV	Up to 0.003 W (0.0003 to 0.01) W (0.001 to 0.03) W (0.003 to 0.10) W (0.010 to 0.30) W (0.030 to 0.7) W (0.07 to 1.5) W (0.15 to 6.7) W	1.1 mW/W 1.4 mW/W 1.1 mW/W 1.5 mW/W 1.0 mW/W 1.1 mW/W 1.1 mW/W 1.0 mW/W	Fluke 5520A
(0.33 to 1020) V	(0.001 to 9.2) W (0.003 to 33.7) W (0.01 to 91.8) W (0.3 to 336.7) W (0.1 to 918) W 0.3 W to 2.2 kW 0.7 W to 4.6 kW 1.5 W to 20.9 kW	0.93 mW/W 0.62 mW/W 0.93 mW/W 0.65 mW/W 0.86 mW/W 0.83 mW/W 0.98 mW/W 0.78 mW/W	

Parameter/Range	Frequency	CMC ^{2,4} (±)	Comments
Inductance – Generate ³			
100 μH	100 Hz	74 nH	GenRad 1482 series
	200 Hz	63 nH	
	400 Hz	35 nH	
	1 kHz	37 nH	
	10 kHz	33 nH	
1 mH	100 Hz	0.19 μH	
	200 Hz	0.19 μH	
	400 Hz	0.20 μH	
	1 kHz	0.19 μH	
	10 kHz	0.40 μH	
10 mH	100 Hz	4.2 μH	
	200 Hz	4.2 μH	
	400 Hz	4.2 μH	
	1 kHz	4.1 μH	
	10 kHz	4.3 μH	
100 mH	100 Hz	18 μH	
	200 Hz	18 μH	
	400 Hz	17 μH	
	1 kHz	16 μH	
	10 kHz	23 μH	
500 mH	100 Hz	76 μH	
	200 Hz	79 μH	
	400 Hz	77 μH	
	1 kHz	95 μH	
1 H	100 Hz	0.39 mH	
	200 Hz	0.39 mH	
	400 Hz	0.39 mH	
	1 kHz	0.39 mH	
5 H	100 Hz	1.8 mH	
	200 Hz	1.8 mH	
	400 Hz	1.8 mH	
	1 kHz	2.2 mH	
10 H	100 Hz	23 mH	
	200 Hz	1.2 mH	
	400 Hz	1.2 mH	
	1 kHz	1.2 mH	
Inductance – Measure ³			
100 μH to 10 H	1 kHz	0.24 mH/H	Gen Rad 1689M

Parameter/Range	Frequency	CMC ^{2,4,6} (±)	Comments	
Capacitance – Measure ³				
(10 to 300) pF	(1 to 5) kHz	0.28 %	Gen Rad 1689M	
(300 to 600) pF	100 Hz to 1 kHz 1 kHz (1 to 10) kHz (10 to 100) kHz	0.48 % 0.065 % 0.57 % 1.1 %		
(0.6 to 1) nF	100 Hz to 1 kHz 1 kHz (1 to 10) kHz (10 to 100) kHz	0.24 % 0.053 % 0.57 % 1.1 %		
(1 to 10) nF	100 Hz to 1 kHz 1 kHz (1 to 10) kHz	0.20 % 0.048 % 0.20 %		
(0.01 to 10) µF	100 Hz to 1 kHz 1 kHz (1 to 5) kHz	0.075 % 0.064 % 0.10 %		
(10 to 110) µF	50 Hz to 1 kHz 1 kHz (1 to 5) kHz	0.15 % 0.067 % 0.77 %		
(110 to 1000) µF	(50 to 100) Hz 100 Hz to 1 kHz	0.17 % 0.48 %		
Up to 10 pF (10 to 100) pF 100 pF to 1 nF	1 kHz 1 kHz 1 kHz	6.9 µF/F 5.8 µF/F 6.3 µF/F		Andeen Hagerling 2500A
Up to 329.999 µF (0.33 to 1.099 99) mF (1.1 to 3.299 99) mF (3.3 to 10.9999) mF (11 to 32.9999) mF (33 to 110) mF	DC DC DC DC DC DC	0.24 mF/F 0.14 mF/F 0.12 mF/F 0.13 mF/F 0.16 mF/F 0.32 mF/F		Fluke 8508A w/ 5720A
Capacitance – Generate ³				
(190 to 400) pF	10 Hz to 10 kHz	4.0 mF/F + 7.8 pF	Fluke 5520A	
400 pF to 1.1 nF	10 Hz to 10 kHz	4.0 mF/F + 7.8 pF		
(1.1 to 3.3) nF	10 Hz to 3 kHz	4.0 mF/F + 7.8 pF		
(3.3 to 11) nF	10 Hz to 1 kHz	2.3 mF/F + 7.8 pF		
(11 to 33) nF	10 Hz to 1 kHz	2.3 mF/F + 78 pF		
(33 to 110) nF	10 Hz to 1 kHz	2.3 mF/F + 78 pF		
(110 to 330) nF	10 Hz to 1 kHz	2.3 mF/F + 230 pF		
330 nF to 1.1 µF	(10 to 600) Hz	2.3 mF/F + 0.78 nF		
(1.1 to 3.3) µF	(10 to 300) Hz	2.3 mF/F + 2.3 nF		
(3.3 to 11) µF	(10 to 150) Hz	2.3 mF/F + 7.8 nF		
(11 to 33) µF	(10 to 120) Hz	3.2 mF/F + 23 nF		
(33 to 110) µF	(10 to 80) Hz	3.7 mF/F + 77 nF		
(110 to 330) µF	Up to 50 Hz	3.7 mF/F + 0.23 µF		
330 µF to 1.1 mF	Up to 20 Hz	3.5 mF/F + 0.78 µF		
(1.1 to 3.3) mF	Up to 6 Hz	3.5 mF/F + 2.3 µF		

Parameter/Range	Frequency	CMC ^{2,4,6} (±)	Comments
Capacitance – Generate ³ (cont) (3.3 to 11) mF (11 to 33) mF (33 to 110) mF	 Up to 2 Hz Up to 0.6 Hz Up to 0.2 Hz	 3.5 mF/F + 7.7 μF 5.8 mF/F + 23 μF 8.5 mF/F + 77 μF	Fluke 5520A
Capacitance – Generate ³ Fixed Points 1 pF	 (0.1 to 1) kHz 1 kHz to 1 MHz (1 to 2) MHz (2 to 3) MHz (3 to 4) MHz (4 to 5) MHz (5 to 10) MHz (10 to 13) MHz	 0.072 % 0.071 % 0.074 % 0.082 % 0.095 % 0.11 % 0.26 % 0.38 %	HP 1638XX capacitance set
10 pF	(0.1 to 1) kHz 1 kHz to 1 MHz (1 to 2) MHz (2 to 3) MHz (3 to 4) MHz (4 to 5) MHz (5 to 10) MHz (10 to 13) MHz	0.072 % 0.071 % 0.071 % 0.071 % 0.071 % 0.071 % 0.072 % 0.072 %	
100 pF	(0.1 to 1) kHz 1 kHz to 1 MHz (1 to 2) MHz (2 to 3) MHz (3 to 4) MHz (4 to 5) MHz (5 to 10) MHz (10 to 13) MHz	0.072 % 0.071 % 0.071 % 0.071 % 0.071 % 0.072 % 0.078 % 0.086 %	
1000 pF	(0.1 to 1) kHz 1 kHz to 1 MHz (1 to 2) MHz (2 to 3) MHz (3 to 4) MHz (4 to 5) MHz (5 to 10) MHz (10 to 13) MHz	0.072 % 0.071 % 0.072 % 0.076 % 0.083 % 0.094 % 0.20 % 0.29 %	
(10, 100) nF	(100 to 120) Hz 120 Hz to 1 kHz (1 to 10) kHz (10 to 100) kHz	0.020 % 0.020 % 0.020 % 0.020 %	
1 μF	(100 to 120) Hz 120 Hz to 1 kHz (1 to 10) kHz (10 to 100) kHz	0.020 % 0.020 % 0.020 % 0.020 %	

Parameter/Equipment	Range	CMC ² (±)	Comments
Electrical Simulation & Measurement of Thermocouple ³ –			
Type B	(600 to 800) °C (800 to 1000) °C (1000 to 1550) °C (1550 to 1820) °C	0.34 °C 0.27 °C 0.24 °C 0.26 °C	Fluke 5520A
Type E	(-250 to -100) °C (-100 to -25) °C (-25 to 350) °C (350 to 650) °C (650 to 1000) °C	0.39 °C 0.13 °C 0.11 °C 0.13 °C 0.17 °C	
Type J	(-210 to -100) °C (-100 to -30) °C (-30 to 150) °C (150 to 760) °C (760 to 1200) °C	0.25 °C 0.13 °C 0.12 °C 0.14 °C 0.18 °C	
Type K	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 1000) °C (1000 to 1372) °C	0.26 °C 0.14 °C 0.13 °C 0.20 °C 0.31 °C	
Type N	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 410) °C (410 to 1300) °C	0.31 °C 0.17 °C 0.15 °C 0.14 °C 0.21 °C	
Type R	(0 to 250) °C (250 to 400) °C (400 to 1000) °C (1000 to 1767) °C	0.45 °C 0.28 °C 0.26 °C 0.32 °C	

Parameter/Equipment	Range	CMC ² (±)	Comments
Electrical Calibration of Thermocouple Indicators ³ – (cont)			
Type S	(0 to 250) °C (250 to 1000) °C (1000 to 1400) °C (1400 to 1767) °C	0.38 °C 0.28 °C 0.29 °C 0.36 °C	Fluke 5520A
Type T	(-250 to -150) °C (-150 to 0) °C (0 to 120) °C (120 to 400) °C	0.50 °C 0.19 °C 0.13 °C 0.11 °C	
Type U	(-200 to 0) °C (0 to 600) °C	0.44 °C 0.21 °C	
Electrical Calibration of RTDs ³ –			
Pt 385, 100 Ω	(-200 to -80) °C (-80 to 0) °C (0 to 100) °C (100 to 300) °C (300 to 400) °C (400 to 630) °C (630 to 800) °C	0.085 °C 0.12 °C 0.12 °C 0.11 °C 0.097 °C 0.11 °C 0.20 °C	Fluke 5520A
Pt 3926, 100 Ω	(-200 to -80) °C (-80 to 0) °C (0 to 100) °C (100 to 300) °C (300 to 400) °C (400 to 630) °C	0.064 °C 0.076 °C 0.089 °C 0.095 °C 0.17 °C 0.21 °C	
Pt 3916, 100 Ω	(-200 to -190) °C (-190 to -80) °C (-80 to 0) °C (0 to 100) °C (100 to 260) °C (260 to 300) °C (300 to 400) °C (400 to 600) °C (600 to 630) °C	0.060 °C 0.068 °C 0.070 °C 0.077 °C 0.077 °C 0.084 °C 0.090 °C 0.13 °C 0.19 °C	

Parameter/Equipment	Range	CMC ² (±)	Comments
Electrical Calibration of RTDs ³ – (cont)			
Pt 385, 200 Ω	(-200 to 100) °C (100 to 260) °C (260 to 300) °C (300 to 400) °C (400 to 600) °C (600 to 630) °C	0.044 °C 0.051 °C 0.098 °C 0.11 °C 0.11 °C 0.13 °C	Fluke 5520A
Pt 385, 500 Ω	(-200 to 80) °C (-80 to 100) °C (100 to 260) °C (260 to 400) °C (400 to 600) °C (600 to 630) °C	0.036 °C 0.044 °C 0.051 °C 0.066 °C 0.073 °C 0.088 °C	
Pt 385, 1000 Ω	(-200 to 0) °C (0 to 100) °C (100 to 260) °C (260 to 300) °C (300 to 400) °C (400 to 600) °C (600 to 630) °C	0.029 °C 0.036 °C 0.042 °C 0.050 °C 0.18 °C 0.057 °C 0.18 °C	
PtNi 385, 120 Ω	(-80 to 0) °C (0 to 100) °C (100 to 260) °C	0.081 °C 0.11 °C 0.11 °C	
Cu 427, 10 Ω	(100 to 260) °C	0.69 °C	
Oscilloscopes –			
Amplitude – DC Signal ³ 50 Ω Load 1 MΩ Load	(-6.6 to 6.6) V (-130 to 130) V	1.9 mV/V + 31 μV 0.39 mV/V + 31 μV	Fluke 5520A/SC1100
Amplitude Square wave ³ – 50 Ω Load	±1 mV to ±6.6 V _{p-p} 10 Hz to 10 kHz	2 mV/V + 31 μV	
1 MΩ Load	±1 mV to ±130 V _{p-p} 10 Hz to 1 kHz	0.78 mV/V + 31 μV	

Parameter/Equipment	Range	CMC ^{2,4,6} (±)	Comments
Oscilloscopes – (cont)			
Edge/Rise Time ³	1 kHz to 2 MHz (200 to 300) ps	19 ps	Fluke 5520A/SC1100
	(2 to 10) MHz (200 to 350) ps	16 ps	
Time Marker Into 50 Ω Load-Source ³	1 ns to 20 ms 50 ms to 5 s	2.1 μs/s (19 + 39t) μs/s	t = time
	Non-Cardinal Points Any 20 ms or less	39 μs/s	
Leveled Sine Wave ³ Relative to 50 kHz [5 mV to 5.5 V] _{p-p}	50 kHz to 100 MHz (100 to 300) MHz (300 to 600) MHz (600 to 1100) MHz	17 mV/V + 100 μV 20 mV/V + 100 μV 34 mV/V + 100 μV 41 mV/V + 100 μV	
(1 to 5) mV Range	500 kHz 1 MHz 2 MHz 5 MHz 10 MHz 50 MHz 100 MHz 150 MHz 200 MHz 250 MHz 300 MHz 350 MHz 400 MHz 450 MHz 500 MHz 550 MHz 600 MHz 1000 MHz	0.074 % 0.075 % 0.077 % 0.11 % 0.11 % 0.72 % 0.88 % 0.88 % 0.89 % 0.89 % 0.89 % 0.89 % 0.88 % 0.89 % 0.89 % 0.90 % 0.89 % 0.91 %	Agilent E4418B & E9304A, Fluke 5790A
(5 to 7.5) mV Range	500 kHz 1 MHz 2 MHz 5 MHz 10 MHz 50 MHz 100 MHz 150 MHz 200 MHz 250 MHz 300 MHz 350 MHz 400 MHz 450 MHz 500 MHz 550 MHz 600 MHz 1000 MHz	0.059 % 0.061 % 0.063 % 0.097 % 0.099 % 0.72 % 0.88 % 0.88 % 0.89 % 0.89 % 0.89 % 0.89 % 0.88 % 0.89 % 0.89 % 0.90 % 0.89 % 0.91 %	



Parameter/Equipment	Range	CMC ^{2,4,6} (±)	Comments
Oscilloscopes – (cont)			
Leveled Sine Wave ³ Relative to 50 kHz			
(7.5 to 9.9) mV Range	500 kHz 1 MHz 2 MHz 5 MHz 10 MHz 50 MHz 100 MHz 150 MHz 200 MHz 250 MHz 300 MHz 350 MHz 400 MHz 450 MHz 500 MHz 550 MHz 600 MHz 1000 MHz	0.059 % 0.061 % 0.063 % 0.097 % 0.099 % 0.72 % 0.88 % 0.88 % 0.89 % 0.89 % 0.89 % 0.89 % 0.89 % 0.89 % 0.89 % 0.89 % 0.90 % 0.89 % 0.91 %	Agilent E4418B & E9304A, Fluke 5790A
(9.9 to 10) mV Range	500 kHz 1 MHz 2 MHz 5 MHz 10 MHz 50 MHz 100 MHz 150 MHz 200 MHz 250 MHz 300 MHz 350 MHz 400 MHz 450 MHz 500 MHz 550 MHz 600 MHz 1000 MHz	0.059 % 0.061 % 0.063 % 0.097 % 0.099 % 0.72 % 0.88 % 0.88 % 0.89 % 0.89 % 0.89 % 0.89 % 0.89 % 0.89 % 0.89 % 0.89 % 0.89 % 0.91 %	
(10 to 25) mV Range	500 kHz 1 MHz 2 MHz 5 MHz 10 MHz 50 MHz 100 MHz 150 MHz 200 MHz 250 MHz 300 MHz 350 MHz 400 MHz 450 MHz 500 MHz 550 MHz	0.039 % 0.047 % 0.047 % 0.086 % 0.089 % 0.70 % 0.86 % 0.87 % 0.87 % 0.87 % 0.88 % 0.88 % 0.88 % 0.87 % 0.87 % 0.88 %	

Parameter/Equipment	Range	CMC ^{2,4,6} (±)	Comments
Oscilloscopes – (cont)			
Leveled Sine Wave ³ Relative to 50 kHz			
(10 to 25) mV Range	600 MHz 1000 MHz	0.88 % 0.89 %	Agilent E4418B & E9304A, Fluke 5790A
(25 to 40) mV Range	500 kHz 1 MHz 2 MHz 5 MHz 10 MHz 50 MHz 100 MHz 150 MHz 200 MHz 250 MHz 300 MHz 350 MHz 400 MHz 450 MHz 500 MHz 550 MHz 600 MHz 1000 MHz	0.039 % 0.046 % 0.046 % 0.086 % 0.089 % 0.69 % 0.85 % 0.85 % 0.86 % 0.86 % 0.86 % 0.86 % 0.86 % 0.86 % 0.86 % 0.87 % 0.87 % 0.89 %	
(40 to 70) mV Range	500 kHz 1 MHz 2 MHz 5 MHz 10 MHz 50 MHz 100 MHz 150 MHz 200 MHz 250 MHz 300 MHz 350 MHz 400 MHz 450 MHz 500 MHz 550 MHz 600 MHz 1000 MHz	0.036 % 0.044 % 0.046 % 0.086 % 0.089 % 0.61 % 0.79 % 0.79 % 0.80 % 0.80 % 0.80 % 0.80 % 0.79 % 0.80 % 0.80 % 0.80 % 0.81 % 0.83 %	
(70 to 99) mV Range	500 kHz 1 MHz 2 MHz 5 MHz 10 MHz 50 MHz 100 MHz 150 MHz 200 MHz 250 MHz 300 MHz 350 MHz 400 MHz	0.036 % 0.045 % 0.046 % 0.085 % 0.088 % 0.60 % 0.78 % 0.78 % 0.79 % 0.79 % 0.79 % 0.79 % 0.79 %	

Parameter/Equipment	Range	CMC ^{2,4,6} (±)	Comments
Oscilloscopes – (cont)			
Leveled Sine Wave ³ Relative to 50 kHz			
(70 to 99) mV Range	450 MHz 500 MHz 550 MHz 600 MHz 1000 MHz	0.79 % 0.80 % 0.80 % 0.80 % 0.81 %	Agilent E4418B & E9304A, Fluke 5790A
(99 to 100) mV Range	500 kHz 1 MHz 2 MHz 5 MHz 10 MHz 50 MHz 100 MHz 150 MHz 200 MHz 250 MHz 300 MHz 350 MHz 400 MHz 450 MHz 500 MHz 550 MHz 600 MHz 1000 MHz	0.036 % 0.045 % 0.046 % 0.085 % 0.088 % 0.60 % 0.78 % 0.78 % 0.79 % 0.79 % 0.79 % 0.79 % 0.79 % 0.79 % 0.80 % 0.80 % 0.80 % 0.81 %	
(100 to 250) mV Range	500 kHz 1 MHz 2 MHz 5 MHz 10 MHz 50 MHz 100 MHz 150 MHz 200 MHz 250 MHz 300 MHz 350 MHz 400 MHz 450 MHz 500 MHz 550 MHz 600 MHz 1000 MHz	0.029 % 0.044 % 0.046 % 0.085 % 0.087 % 0.45 % 0.69 % 0.69 % 0.69 % 0.69 % 0.70 % 0.70 % 0.69 % 0.70 % 0.70 % 0.71 % 0.70 % 0.73 %	
(250 to 399) mV Range	500 kHz 1 MHz 2 MHz 5 MHz 10 MHz 50 MHz 100 MHz 150 MHz 200 MHz	0.030 % 0.045 % 0.047 % 0.088 % 0.097 % 0.45 % 0.69 % 0.69 % 0.69 %	

Parameter/Equipment	Range	CMC ^{2, 4, 6} (±)	Comments
Oscilloscopes – (cont)			
Leveled Sine Wave ³ Relative to 50 kHz (250 to 399) mV Range	250 MHz	0.69 %	Agilent E4418B & E9304A, Fluke 5790A
	300 MHz	0.70 %	
	350 MHz	0.70 %	
	400 MHz	0.69 %	
	450 MHz	0.69 %	
	500 MHz	0.70 %	
	550 MHz	0.70 %	
	600 MHz	0.71 %	
	1000 MHz	0.74 %	
(399 to 400) mV Range	500 kHz	0.030 %	
	1 MHz	0.045 %	
	2 MHz	0.047 %	
	5 MHz	0.088 %	
	10 MHz	0.097 %	
	50 MHz	0.45 %	
	100 MHz	0.69 %	
	150 MHz	0.69 %	
	200 MHz	0.69 %	
	250 MHz	0.69 %	
	300 MHz	0.70 %	
	350 MHz	0.70 %	
	400 MHz	0.69 %	
	450 MHz	0.69 %	
	500 MHz	0.70 %	
	(400 to 800) mV Range	500 kHz	
1 MHz		0.045 %	
2 MHz		0.047 %	
5 MHz		0.088 %	
10 MHz		0.097 %	
50 MHz		0.43 %	
100 MHz		0.68 %	
150 MHz		0.68 %	
200 MHz		0.68 %	
250 MHz		0.68 %	
300 MHz		0.69 %	
350 MHz		0.69 %	
400 MHz		0.68 %	
450 MHz		0.68 %	
500 MHz		0.68 %	
550 MHz		0.69 %	
(0.8 to 1.2) V Range	600 MHz	0.69 %	
	1000 MHz	0.73 %	
	500 kHz	0.029 %	
	1 MHz	0.044 %	
	2 MHz	0.046 %	
	5 MHz	0.085 %	
10 MHz	0.087 %		
	50 MHz	0.45 %	
	100 MHz	0.69 %	

Parameter/Equipment	Range	CMC ^{2, 4, 6} (±)	Comments
Oscilloscopes – (cont)			
Leveled Sine Wave ³ Relative to 50 kHz			
(0.8 to 1.2) V Range	150 MHz 200 MHz 250 MHz 300 MHz 350 MHz 400 MHz 450 MHz 500 MHz 550 MHz 600 MHz 1000 MHz	0.69 % 0.69 % 0.69 % 0.70 % 0.70 % 0.69 % 0.70 % 0.70 % 0.71 % 0.71 % 0.74 %	Agilent E4418B & E9304A, Fluke 5790A
(1.2 to 1.3) V Range	500 kHz 1 MHz 2 MHz 5 MHz 10 MHz 50 MHz 100 MHz 150 MHz 200 MHz 250 MHz 300 MHz 350 MHz 400 MHz 450 MHz 500 MHz 550 MHz 600 MHz 1000 MHz	0.029 % 0.044 % 0.046 % 0.085 % 0.087 % 0.45 % 0.69 % 0.69 % 0.69 % 0.69 % 0.70 % 0.70 % 0.69 % 0.70 % 0.70 % 0.71 % 0.71 % 0.74 %	
(1.3 to 3.4) V Range	500 kHz 1 MHz 2 MHz 5 MHz 10 MHz 50 MHz 100 MHz 150 MHz 200 MHz 250 MHz 300 MHz 350 MHz 400 MHz 450 MHz 500 MHz 550 MHz 600 MHz 1000 MHz	0.029 % 0.044 % 0.046 % 0.085 % 0.087 % 0.53 % 0.74 % 0.74 % 0.74 % 0.74 % 0.75 % 0.75 % 0.75 % 0.75 % 0.76 % 0.76 % 0.76 % 0.79 %	

Parameter/Equipment	Range	CMC ^{2,4,6} (±)	Comments
Oscilloscopes – (cont)			
Leveled Sine Wave ³ Relative to 50 kHz			
(3.4 to 5.5) V Range	500 kHz	0.032 %	Agilent E4418B & E9304A, Fluke 5790A
	1 MHz	0.046 %	
	2 MHz	0.049 %	
	5 MHz	0.088 %	
	10 MHz	0.092 %	
	50 MHz	0.73 %	
	100 MHz	0.90 %	
	150 MHz	0.90 %	
	200 MHz	0.90 %	
	250 MHz	0.90 %	
	300 MHz	0.91 %	
	350 MHz	0.91 %	
	400 MHz	0.91 %	
	450 MHz	0.91 %	
	500 MHz	0.91 %	
	550 MHz	0.92 %	
	600 MHz	0.91 %	
Sine Wave Flatness ³ Absolute Power			
(10 to 100) mV	50 kHz to 6 GHz	4.2 %	
100 mV to 5.5 V	50 kHz to 6 GHz	2.6 %	
Sine Wave Flatness ³ Relative Power			
(5 to 40) mV	(50 to 100) MHz	2.6 %	
(5 to 40) mV	100 MHz to 1 GHz	4.2 %	
40 mV to 5.5 V	(50 to 100) MHz	2.5 %	
40 mV to 5.5 V	100 MHz to 1 GHz	4.2 %	
Rise Time – Measure	16.8 ps to 1.2 ns Positive/Negative	5.2 ps	Tek TDS 8200 w/80E03
Leveled Sine Wave – Harmonic Amplitude	(-30 to -80) dBm 100 kHz to 5 GHz	2.3 dB	HP 8563E

Parameter/Range	Frequency	CMC ^{2, 4, 6} (±)	Comments
AC Level Flatness ³ –			
Up to 3 V	Up to 100 Hz	0.063 %	Thermal converters w/HP 3458A opt 002 w/Fluke 5720A
	100 Hz	0.051 %	
	10 kHz	0.049 %	
	(0.1 to 30) kHz	0.052 %	
	100 kHz	0.083 %	
	300 kHz	0.081 %	
	(0.03 to 1) MHz	0.084 %	
	3 MHz	0.2 %	
	8 MHz	0.21 %	
	(1 to 10) MHz	0.21 %	
	20 MHz	0.58 %	
	(10 to 30) MHz	0.59 %	
	(30 to 50) MHz	1.3 %	
	70 MHz	2.9 %	
	80 MHz	2.9 %	
(50 to 100) MHz	2.9 %		
Up to 1 V	Up to 100 Hz	0.057 %	
	100 Hz	0.045 %	
	(0.1 to 10) kHz	0.042 %	
	30 kHz	0.045 %	
	(10 to 100) kHz	0.045 %	
	300 kHz	0.042 %	
	(0.1 to 1) MHz	0.046 %	
	3 MHz	0.052 %	
	8 MHz	0.058 %	
	10 MHz	0.061 %	
	20 MHz	0.12 %	
	30 MHz	0.21 %	
	(1 to 50) MHz	0.45 %	
	70 MHz	0.80 %	
	(50 to 80) MHz	0.99 %	
(80 to 100) MHz	1.5 %		

Parameter/Range	Frequency	CMC ^{2, 4, 6} (±)	Comments
AC Level Flatness ³ – (cont) Up to 0.5 V	Up to 100 Hz 100 Hz (0.1 to 10) kHz 30 kHz (10 to 100) kHz 300 kHz (0.1 to 1) MHz 3 MHz 8 MHz 10 MHz 20 MHz (1 to 30) MHz (30 to 50) MHz 70 MHz 80 MHz (50 to 100) MHz	0.2 % 0.056 % 0.054 % 0.073 % 0.073 % 0.11 % 0.11 % 0.21 % 0.22 % 0.22 % 0.22 % 0.23 % 1.3 % 2.9 % 2.9 % 2.9 %	Thermal converters w/HP 3458A opt 002 w/Fluke 5720A
Phase – Measure (0 to 360)° (10 to 20) mV > 20 mV to 350 V ± 180 ° (10 to 20) mV > 20 mV to 350 V	(5 to 10) Hz 10 Hz to 50 kHz (50 to 100) kHz (5 to 10) Hz 10 Hz to 50 kHz (50 to 100) kHz (5 to 10) Hz 10 Hz to 50 kHz (50 to 100) kHz (5 to 10) Hz 10 Hz to 50 kHz (50 to 100) kHz	0.46° 0.12° 2.1 m° / kHz + 0.12° 0.23° 63 m° 1.2 m° / kHz + 58 m° 0.46° 0.23° 2.1 m° / kHz + 0.12° 0.23° 61 m° 1.2 m° / kHz + 58 m°	Clarke-Hess 6000

V. Electrical – RF / Microwave

Parameter/Range	Frequency	CMC ^{2,9} (±)	Comments
RF Attenuation – Tuned RF Power Measure ³			
(0 to -10) dB (-10 to -20) dB (-20 to -30) dB (-30 to -40) dB (-40 to -50) dB (-50 to -60) dB (-60 to -70) dB (-70 to -80) dB (-80 to -90) dB (-90 to -95) dB (-95 to -100) dB (-100 to -105) dB (-105 to -110) dB (-110 to -115) dB (-115 to -120) dB (-120 to -125) dB	100 kHz to 10 MHz	0.018 dB 0.024 dB 0.029 dB 0.035 dB 0.041 dB 0.047 dB 0.052 dB 0.058 dB 0.064 dB 0.071 dB 0.075 dB 0.086 dB 0.094 dB 0.13 dB 0.21 dB 0.27 dB	Rohde & Schwarz FSMR26
(0 to -5) dB (-5 to -10) dB (-10 to -20) dB (-20 to -30) dB (-30 to -40) dB (-40 to -50) dB (-50 to -60) dB (-60 to -70) dB (-70 to -80) dB (-80 to -85) dB (-85 to -90) dB (-90 to -100) dB (-100 to -105) dB (-105 to -110) dB (-110 to -115) dB (-115 to -120) dB (-120 to -130) dB (-130 to -135) dB	10 MHz to 22 GHz	0.018 dB 0.019 dB 0.024 dB 0.029 dB 0.035 dB 0.041 dB 0.047 dB 0.053 dB 0.059 dB 0.065 dB 0.068 dB 0.074 dB 0.082 dB 0.092 dB 0.094 dB 0.22 dB 0.47 dB 1.3 dB	
(0 to -5) dB (-5 to -10) dB (-10 to -15) dB (-15 to -20) dB (-20 to -25) dB (-25 to -30) dB (-30 to -35) dB (-35 to -40) dB (-40 to -45) dB	(22 to 26.5) GHz	0.22 dB 0.28 dB 0.35 dB 0.34 dB 0.30 dB 0.21 dB 0.31 dB 0.26 dB 0.35 dB	

Parameter/Range	Frequency	CMC ^{2,9} (±)	Comments
RF Attenuation – Tuned RF Power Measure ³ (cont)			Rohde & Schwarz FSMR26
(-45 to -50) dB	(22 to 26.5) GHz	0.41 dB	
(-50 to -55) dB		0.35 dB	
(-55 to -60) dB		0.32 dB	
(-60 to -65) dB		0.51 dB	
(-65 to -70) dB		0.38 dB	
(-70 to -75) dB		0.23 dB	
(-75 to -80) dB		0.27 dB	
(-80 to -85) dB		0.34 dB	
(-85 to -90) dB		0.31 dB	
(-90 to -95) dB		0.30 dB	
(-95 to -100) dB		0.27 dB	
(-100 to -105) dB		0.27 dB	
(-105 to -110) dB		0.31 dB	
(-110 to -115) dB		0.45 dB	
(-115 to -120) dB		0.31 dB	
(-120 to -130) dB		2.9 dB	
(-130 to -135) dB		1.3 dB	
RF Power – Generate ³			Fluke 96270A/LL/FF w/leveling head
(16 to 24) dBm	(0.2 to 100) kHz (0.1 to 125) MHz	0.023 dB 0.047 dB	
(13 to 16) dBm	(0.2 to 100) kHz (0.1 to 150) MHz (0.25 to 1.4) GHz	0.023 dB 0.045 dB 0.16 dB	
(-7 to 13) dBm	(0.2 to 100) kHz (0.1 to 300) MHz (0.3 to 1.4) GHz (1.4 to 4.0) GHz	0.024 dB 0.050 dB 0.17 dB 0.27 dB	
(-47 to -17) dBm	(0.2 to 100) kHz (0.1 to 300) MHz (0.3 to 1.4) GHz (1.4 to 3.5) GHz (3.5 to 4.0) GHz	0.024 dB 0.050 dB 0.17 dB 0.26 dB 0.41 dB	
(-66 to -47) dBm	(0.1 to 10) MHz (10 to 300) MHz (0.3 to 1.4) GHz (1.4 to 4) GHz	0.16 dB 0.088 dB 0.33 dB 0.44 dB	
(-95 to -66) dBm	(0.1 to 10) MHz (10 to 150) MHz (0.15 to 1.5) GHz (1.5 to 4) GHz	0.40 dB 0.10 dB 0.42 dB 0.80 dB	
(-124 to -95) dBm	(10 to 100) MHz (0.1 to 1.4) GHz	0.62 dB 1.4 dB	

Parameter/Range	Frequency	CMC ^{2, 6, 9} (±)	Comments
Sine Output Level Accuracy – 50 Ω (Microwave Output) (-4 to +24) dBm	(0.2 to 100) kHz (0.1 to 125) MHz (0.2 to 100) kHz (0.1 to 150) MHz (0.25 to 1.4) GHz (0.2 to 100) kHz (0.1 to 300) MHz (0.3 to 1.4) GHz (1.4 to 4.0) GHz (0.2 to 100) kHz (0.1 to 300) MHz (0.3 to 1.4) GHz (1.4 to 3.5) GHz (3.5 to 4.0) GHz (0.1 to 10) MHz (10 to 300) MHz (0.3 to 1.4) GHz (1.4 to 4) GHz (0.1 to 10) MHz (10 to 150) MHz (0.15 to 1.5) GHz (1.5 to 4) GHz (10 to 100) MHz (0.1 to 1.4) GHz	0.023 dB 0.047 dB 0.023 dB 0.045 dB 0.16 dB 0.024 dB 0.050 dB 0.17 dB 0.27 dB 0.024 dB 0.050 dB 0.17 dB 0.26 dB 0.41 dB 0.16 dB 0.088 dB 0.33 dB 0.44 dB 0.40 dB 0.10 dB 0.42 dB 0.80 dB 0.62 dB 1.4 dB	Fluke 96270A/LL/FF w/leveling head
RF Power – Generate & Measure ³ (-35 to +20) dBm	DC to 100 MHz > 100 MHz to 2.4 GHz (> 2.4 to 8.0) GHz (> 8.0 to 12.4) GHz (> 12.4 to 18.0) GHz (> 18.0 to 26.5) GHz	0.016 dB 0.042 dB 0.064 dB 0.080 dB 0.097 dB 0.097 dB	NRP40T w/power meter
Amplitude Modulation Distortion – Measure Depth of Modulation: (5 to 99) %	Carrier Frequency: 100 kHz to 10 MHz ≥10 MHz	0.36 % 0.44 %	R&S FSMR26
Frequency Modulation Distortion – Measure Deviation <10 kHz Deviation <50 kHz Deviation < 100 kHz Deviation <500 kHz	200 kHz to 10 MHz ≥10 MHz	0.19 % 0.38 % 0.20 % 0.38 %	R&S FSMR26

Parameter/Range	Frequency	CMC ^{2, 6, 9} (±)	Comments
Phase Modulation Distortion – Measure	200 kHz to 10 MHz ≥10 MHz	0.18 % 0.18 %	R&S FSMR26
Distortion – Audio Input – Measure (-100 to 0) dB Mod Rate 100 Hz Mod Rate 20 kHz Mod Rate 100 kHz	10 Hz to 100 kHz	0.59 dB 0.60 dB 0.60 dB	R&S FSMR26
Distortion / DANL – Measuring Equipment	20 Hz to 26.5 GHz (-30 to -170) dBm	0.76 dB	50 Ω load
RF Power – Measure ³ Power Reference Out 1 mW (+20 to -30) dBm (+35 to -10) dBm (-20 to -70) dBm	50 MHz (0.1 to 4.2) GHz (0.05 to 26.5) GHz (0.01 to 18) GHz (0.01 to 18) GHz	0.33 % 2.5 % 3.8 % 3.9 % 4.4 %	HP 478A opt H75 H77, Tegam 1830A HP 438A w/ HP 8482A HP 438A w/ HP 8485A HP 438A w/ HP 8481H HP 438A w/ HP 8484A
RF Attenuation – Measure ³ (10 to 50) dB in 10 dB Steps	30 MHz	0.034 dB	HP 11812A
Phase Modulation – Measure ³ Rate: 50 Hz to 10 kHz Rate: 50 Hz to 100 kHz	200 kHz to 10 MHz 10 MHz to 26.5 GHz	1.0 % 1.0 %	Rohde & Schwarz FSMR26

Parameter/Range	Frequency	CMC ^{2,9} (±)	Comments
Phase Noise – Measure ³			
Carrier Frequency (1 to 10) MHz (-40 to -176) dBc	1 Hz Offset 10 Hz Offset 100 Hz Offset 1 kHz Offset 10 kHz Offset 100 kHz Offset 1 MHz Offset	2.7 dB 2.5 dB 1.6 dB 1.6 dB 1.6 dB 1.6 dB 4.0 dB	Rohde & Schwarz FSWP26
(10 to 100) MHz (-66 to -175) dBc	1 Hz Offset 10 Hz Offset 100 Hz Offset 1 kHz Offset 10 kHz Offset 100 kHz Offset 1 MHz Offset 10 MHz Offset >30 MHz Offset	3.7 dB 2.8 dB 1.6 dB 1.6 dB 1.6 dB 1.6 dB 2.7 dB 3.3 dB 4.0 dB	
100 MHz to 1 GHz (-46 to -173) dBc	1 Hz Offset 10 Hz Offset 100 Hz Offset 1 kHz Offset 10 kHz Offset 100 kHz Offset 1 MHz Offset 10 MHz Offset >30 MHz Offset	3.2 dB 2.4 dB 1.7 dB 1.6 dB 1.6 dB 1.6 dB 3.9 dB 4.0 dB 4.0 dB	
(1 to 3) GHz (+10 to -170) dBc	1 Hz Offset 10 Hz Offset 100 Hz Offset 1 kHz Offset 10 kHz Offset 100 kHz Offset 1 MHz Offset 10 MHz Offset >30 MHz Offset	4.2 dB 2.0 dB 1.6 dB 1.6 dB 1.6 dB 1.6 dB 3.8 dB 4.4 dB 4.1 dB	
(3 to 7) GHz (+17 to -166) dBc	1 Hz Offset 10 Hz Offset 100 Hz Offset 1 kHz Offset 10 kHz Offset 100 kHz Offset 1 MHz Offset 10 MHz Offset >30 MHz Offset	4.4 dB 2.6 dB 1.7 dB 1.6 dB 1.6 dB 1.6 dB 3.3 dB 3.9 dB 4.6 dB	

Parameter/Range	Frequency	CMC ^{2,6,9} (±)	Comments
Phase Noise – Measure ³ (cont)			
(7 to 10) GHz (+20 to -175) dBc	1 Hz Offset 10 Hz Offset 100 Hz Offset 1 kHz Offset 10 kHz Offset 100 kHz Offset 1 MHz Offset 10 MHz Offset >30 MHz Offset	4.4 dB 2.7 dB 1.8 dB 1.6 dB 1.6 dB 1.6 dB 3.5 dB 3.3 dB 4.6 dB	Rohde & Schwarz FSWP26
(10 to 16) GHz (+24 to -171) dBc	1 Hz Offset 10 Hz Offset 100 Hz Offset 1 kHz Offset 10 kHz Offset 100 kHz Offset 1 MHz Offset 10 MHz Offset >30 MHz Offset	3.2 dB 2.7 dB 1.7 dB 1.6 dB 1.6 dB 1.6 dB 3.3 dB 4.1 dB 4.0 dB	
(16 to 26.5) GHz (+28 to -167) dBc	1 Hz Offset 10 Hz Offset 100 Hz Offset 1 kHz Offset 10 kHz Offset 100 kHz Offset 1 MHz Offset 10 MHz Offset >30 MHz Offset	4.1 dB 2.7 dB 1.7 dB 1.6 dB 1.6 dB 1.6 dB 3.6 dB 4.2 dB 4.0 dB	
Digital Modulation – Measure ³			
Carrier: 2 MHz to 26.5 GHz			Rohde & Schwarz FSMR26
Error Vector Magnitude for Modulation	Symbol Rate ≤ 1 MHz ≤ 10 MHz ≤ 15 MHz	0.53 % 1.1 % 2.1 %	Types: 2FSK & 4FSK (include GFSK), BPSK, QPSK (3GPP WCDMA, CDMA2000®), OQPSK, DQPSK, π/4 DQPSK, 8PSK, D8PSK, 3 π/8, 8PSK (EDGE), 16QAM, 32QAM, 64QAM, 128QAM, 256 QAM, D16QAM, D32QAM, D64QAM, D128QAM, D256QAM, 8VSB, GSM, NADC, PDC, PHS, Bluetooth®, DECT, TETRA
Phase Error for Modulation	Mod Freq Span ≤ 100 kHz ≤ 1 MHz ≤ 10 MHz > 10 MHz	0.32 ° 0.42 ° 0.64 ° 1.3 °	

Parameter/Range	Frequency	CMC ^{2,6,9} (\pm)	Comments
Amplitude Modulation – Generate ³			
Rate: 20 Hz to 100 kHz Depths: 0 % to 95 %	(11 to 13.5) MHz	0.20 %	HP 11715A
Rate: 20 Hz to 100 kHz Depths: 95 % to 99 %	(11 to 13.5) MHz	0.33 %	
Amplitude Modulation – Generate/Measure ³			
Rate: 10 Hz to 10 kHz Depth: (5 to 99) %	(0.1 to 10) MHz	1.5 %	HP 83640B monitored by Rohde & Schwarz FSMR26
Rate: 10 Hz to 50 kHz Depth: (5 to 99) %	(0.01 to 26.5) GHz	1.0 %	
Rate: (50 to 100) kHz Depth: (5 to 99) %	(0.01 to 26.5) GHz	1.5 %	
Rate: (90 to 150) Hz Depth: (5 to 99) %	(0.01 to 26.5) GHz	0.42 %	
Frequency Modulation – Generate ³			
Rate: 20 Hz to 200 kHz Dev.: \leq 400 kHz peak	10 kHz to 432 MHz	0.39 %	HP 11715A
Frequency Modulation – Generate/Measure ³			
Rate: 10 Hz to 10 kHz Dev: \leq 50 kHz peak	(0.1 to 10) MHz	1.2 %	Rohde & Schwarz FSMR26
Rate: 10 Hz to 100 kHz Dev: \leq 500 kHz peak	(0.02 to 26.5) GHz	1.2 %	
Rate: (100 to 200) kHz Dev: \leq 500 kHz peak	(0.01 to 26.5) GHz	3.5 %	

Parameter/Range	Frequency	CMC ^{2, 6, 9} (±)	Comments
Power Sensor – Calibration Factor ^{3, 7}			
100 kHz to 18 GHz Power Sensor Calibration Factor – Type N	100 kHz 300 kHz 500 kHz 1 MHz 3 MHz 5 MHz 10 MHz, 30 MHz 50 MHz (100, 300, 500) MHz 1 GHz 1.5 GHz (2, 3, 4) GHz (5, 6) GHz (7, 8, 9) GHz 10 GHz (11, 12, 12.4) GHz 13 GHz 14 GHz 15 GHz 16 GHz 17 GHz 18 GHz	0.88 % 0.81 % 0.80 % 0.80 % 0.80 % 0.80 % 0.80 % 0.80 % 0.80 % 0.80 % 0.81 % 0.83 % 0.87 % 0.87 % 0.87 % 0.97 % 0.97 % 0.97 % 0.97 % 0.97 % 0.97 % 1.0 %	Tegam F1130B, Tegam 1830A
10 MHz to 26.5 GHz – 3.5 mm	10 MHz 50 MHz 100 MHz (300, 500) MHz (1, 1.5, 2, 3) GHz (4, 5) GHz (6, 7, 8, 9) GHz (10, 11, 12, 12.4) GHz 13 GHz 14 GHz 15 GHz (16, 17) GHz (18, 19) GHz (20, 21) GHz 22 GHz (23, 24, 25, 26) GHz 26.5 GHz	2.0 % 1.5 % 1.5 % 1.5 % 1.5 % 1.6 % 1.8 % 2.0 % 2.0 % 2.5 % 2.5 % 2.5 % 2.8 % 2.5 % 2.5 % 3.1 % 3.1 %	Agilent E4419B, HP 8485A, Tegam 1830A, Tegam F1135B

Parameter/Range	Frequency	CMC ² (±)	Comments
Reflection Coefficient ³			
0.0 < ρ < 0.2	30 kHz to 1.2 GHz (1.2 to 3) GHz (3 to 6) GHz	0.0019 ρ 0.0028 ρ 0.053 ρ	HP 8753D
0.2 < ρ < 0.4	30 kHz to 1.2 GHz (1.2 to 3) GHz (3 to 6) GHz	0.0022 ρ 0.0031 ρ 0.0056 ρ	
0.4 < ρ < 0.6	30 kHz to 1.2 GHz (1.2 to 3) GHz (3 to 6) GHz	0.0027 ρ 0.0035 ρ 0.0062 ρ	
0.6 < ρ < 0.8	30 kHz to 1.2 GHz (1.2 to 3) GHz (3 to 6) GHz	0.0033 ρ 0.0042 ρ 0.0078 ρ	
0.8 < ρ < 1.0	30 kHz to 1.2 GHz (1.2 to 3) GHz (3 to 6) GHz	0.004 ρ 0.005 ρ 0.0091 ρ	
0 < ρ < 0.05	(0.01 to < 8.4) GHz (8.4 to < 12.4) GHz (12.4 to < 18) GHz (18 to < 20) GHz (20 to 26.5) GHz	0.0066 ρ 0.016 ρ 0.016 ρ 0.016 ρ 0.017 ρ	HP 8757D w/85027B
0.05 < ρ < 0.1	(0.01 to < 8.4) GHz (8.4 to < 12.4) GHz (12.4 to < 18) GHz (18 to < 20) GHz (20 to 26.5) GHz	0.0049 ρ 0.015 ρ 0.015 ρ 0.015 ρ 0.016 ρ	
0.1 < ρ < 0.3	(0.01 to < 8.4) GHz (8.4 to < 12.4) GHz (12.4 to < 18) GHz (18 to < 20) GHz (20 to 26.5) GHz	0.0070 ρ 0.016 ρ 0.016 ρ 0.016 ρ 0.018 ρ	
0.3 < ρ < 0.5	(0.01 to < 8.4) GHz (8.4 to < 12.4) GHz (12.4 to < 18) GHz (18 to < 20) GHz (20 to 26.5) GHz	0.0070 ρ 0.016 ρ 0.016 ρ 0.016 ρ 0.018 ρ	

Parameter/Range	Frequency	CMC ² (±)	Comments
Reflection Coefficient ³ (cont) 0.5 < ρ < 0.75 0.75 < ρ < 1	(0.01 to < 8.4) GHz (8.4 to < 12.4) GHz (12.4 to < 18) GHz (18 to < 20) GHz (20 to 26.5) GHz (0.01 to < 8.4) GHz (8.4 to < 12.4) GHz (12.4 to < 18) GHz (18 to < 20) GHz (20 to 26.5) GHz	0.017 ρ 0.017 ρ 0.017 ρ 0.017 ρ 0.020 ρ 0.38 ρ 0.38 ρ 0.38 ρ 0.38 ρ 0.59 ρ	HP 8757D w/85027B
Reflection Phase ³ 0.0 < ρ < 1.0	30 kHz to 1.2 GHz (1.2 to 3) GHz (3 to 6) GHz	1.2 ° 1.3 ° 1.5 °	HP 8753D
Transmission Phase ³ (-15 to 10) dBm (-25 to 0) dBm (-35 to -10) dBm (-45 to -20) dBm (-55 to -30) dBm (-65 to -40) dBm (-75 to -50) dBm (-85 to -60) dBm (-15 to 10) dBm (-25 to 0) dBm (-35 to -10) dBm (-45 to -20) dBm (-55 to -30) dBm (-65 to -40) dBm (-75 to -50) dBm (-85 to -60) dBm	30 kHz to 3 GHz (3 to 6) GHz	1.2 ° 0.77 ° 3.5 ° 2.4 ° 2.9 ° 1.8 ° 2.7 ° 2.5 ° 0.76 ° 0.22 ° 0.36 ° 0.57 ° 1.4 ° 2.1 ° 3.2 ° 3.9 °	HP 8753D
Transmission Magnitude ³ (-15 to 10) dBm (-25 to 0) dBm (-35 to -10) dBm (-45 to -20) dBm (-55 to -30) dBm (-65 to -40) dBm (-75 to -50) dBm (-85 to -60) dBm	30 kHz to 3 GHz	0.34 dB 0.21 dB 0.18 dB 0.84 dB 0.30 dB 0.48 dB 0.67 dB 1.1 dB	HP 8753D

Parameter/Range	Frequency	CMC ^{2,9} (±)	Comments
Transmission Magnitude ³ (cont)			
(-15 to 10) dBm (-25 to 0) dBm (-35 to -10) dBm (-45 to -20) dBm (-55 to -30) dBm (-65 to -40) dBm (-75 to -50) dBm (-85 to -60) dBm	(3 to 6) GHz	0.11 dB 0.023 dB 0.037 dB 0.061 dB 0.13 dB 0.36 dB 0.72 dB 0.79 dB	HP 8753D
Return Loss – Measure ³			
Into 50 Ω: (0 to 5) dB	10 MHz to 8.4 GHz (8.4 to 12.4) GHz (12.4 to 18) GHz (18 to 20) GHz (20 to 26.5) GHz	2.5 dB 2.4 dB 2.5 dB 2.5 dB 2.5 dB	HP 8757D w/85027B
(5 to 10) dB	10 MHz to 8.4 GHz (8.4 to 12.4) GHz (12.4 to 18) GHz (18 to 20) GHz (20 to 26.5) GHz	2.5 dB 2.4 dB 2.5 dB 2.5 dB 2.5 dB	
(10 to 20) dB	10 MHz to 8.4 GHz (8.4 to 12.4) GHz (12.4 to 18) GHz (18 to 20) GHz (20 to 26.5) GHz	2.5 dB 2.5 dB 2.5 dB 2.5 dB 2.6 dB	
(20 to 30) dB	10 MHz to 8.4 GHz (8.4 to 12.4) GHz (12.4 to 18) GHz (18 to 20) GHz (20 to 26.5) GHz	2.7 dB 3.0 dB 2.9 dB 2.8 dB 3.5 dB	
(30 to 40) dB	10 MHz to 8.4 GHz (8.4 to 12.4) GHz (12.4 to 18) GHz (18 to 20) GHz (20 to 26.5) GHz	4.5 dB 7.5 dB 6.3 dB 5.4 dB 12 dB	

VI. Fluid Quantities

Parameter/Equipment	Range	CMC ^{2,6,9} (±)	Comments
Gas Flow – Measuring Equipment	(1 to 100 000) sccm	0.19 %	DHI Molbloccs w/ Molbox
	(100 000 to 300 000) sccm	0.19 %	
	(0 to 120) SLM	0.19 %	DHI Molbloccs S w/ Molbox
	(120 to 600) SLM (600 to 3000) SLM	0.17 % 0.21 %	
Liquid Flow – Measuring Equipment	(0.04 to 400) gpm	0.14 %	Flow calibrator
Air Velocity – Measuring Equipment	Up to 200 ft/min	2.0 %	Wind tunnel w/ flow measurement system
	(> 200 to 300) ft/min	1.8 %	
	(> 300 to 400) ft/min	1.8 %	
	(> 400 to 1000) ft/min	1.7 %	
	(> 1000 to 3000) ft/min	1.8 %	
	(> 3000 to 4000) ft/min	2.1 %	
	(> 4000 to 5000) ft/min (> 5000 to 9000) ft/min	2.3 % 2.2 %	

VII. Mechanical

Parameter/Equipment	Range	CMC ^{2,6,9} (±)	Comments
Pressure – Measure & Measuring Equipment Pneumatic Absolute	(0.2 to 25) psia	0.0018 %	Ruska 2465
	(1.7 to 100) psia	0.0020 %	
	(2 to 1000) psia	0.0033 %	
	(0 to 15) psia	0.012 % of FS	Mensor CPR6050
	(15 to 30) psia	0.012 %	
	(0 to 50) psia	0.012 % of FS	Mensor CPR6050
	(50 to 100) psia	0.013 %	
	(0 to 600) psia	0.013 % of FS	Mensor CPR6050
	(600 to 1200) psia	0.013 %	
	(0 to 1500) psia	0.013 % of FS	Mensor CPR6050
(1500 to 3000) psia	0.013 %		

Parameter/Equipment	Range	CMC ^{2, 6, 9} (±)	Comments
Pressure – Measure & Measuring Equipment (cont)			
Pneumatic Gage & Transducers	(0.2 to 25) psig (1.7 to 100) psig (2 to 1000) psig (0 to 15) psig (15 to 30) psig (0 to 50) psig (50 to 100) psig (0 to 600) psig (600 to 1200) psig (0 to 1500) psig (1500 to 3000) psig (0 to 10) in·H ₂ O	0.0018 % 0.0020 % 0.0033 % 0.012 % of FS 0.012 % 0.012 % of FS 0.013 % 0.013 % of FS 0.013 % 0.013 % of FS 0.013 % 0.012 % of FS	Ruska 2465 Mensor CPR6050 Mensor CPR6050 Mensor CPR6050 Mensor CPR6050 Mensor 2100
Hydraulic Gage	(0 to 3) in·H ₂ O (3 to 30) in·H ₂ O Up to 30 000 psig (30 000 to 75 000) psig	0.012 % 0.010 % 0.0031 % 0.0043 %	Fluke 7250LP Fluke PG7302-2 Fluke PG7302-5
Differential	(-10 to 10) psid	0.0012 psid	Mensor 5014
Torque – Measure ³	(5 to 50) in·lbf (50 to 250) in·lbf (250 to 1000) in·lbf (25 to 250) ft·lbf (60 to 600) ft·lbf	0.32 % 0.32 % 0.32 % 0.32 % 0.32 %	CDI 950-DT w/ TTPM-41

Parameter/Equipment	Range	CMC ^{2,9} (±)	Comments
Mass – Measure	Up to 1 mg	5.1 µg	UMX5
	(1 to 2) mg	1.3 µg	UMX5
	(2 to 5) mg	1.5 µg	UMX5
	(5 to 10) mg	1.8 µg	UMX5
	(10 to 20) mg	1.9 µg	UMX5
	(20 to 50) mg	1.6 µg	UMX5
	(50 to 100) mg	3.7 µg	UMX5
	(100 to 200) mg	3.2 µg	UMX5
	(200 to 500) mg	4.6 µg	UMX5
	(0.5 to 1) g	2.3 µg	UMX5
	(1 to 2) g	2.5 µg	UMX5
	(2 to 3) g	2.9 µg	UMX5
	(3 to 5) g	4.8 µg	UMX5
	(5 to 10) g	21 µg	AX106
	(10 to 50) g	19 µg	AX106
	(50 to 100) g	50 µg	AX106
	(100 to 200) g	52 µg	AT1005
	(200 to 300) g	60 µg	AT1005
	(300 to 500) g	0.84 mg	AT1005
	(0.5 to 1) kg	0.12 mg	AT1005
	(1 to 2) kg	0.47 mg	PR2004
	(2 to 3) kg	1.8 mg	XPE26003LC
	(3 to 5) kg	1.0 mg	XPE26003LC
	(5 to 10) kg	1.7 mg	XPE26003LC
	(10 to 20) kg	8.7 mg	XPE26003LC
	(20 to 26) kg	13 mg	XPE26003LC
Fixed Points	1 mg	5.1 µg	Master weights
	2 mg	1.3 µg	
	3 mg	1.8 µg	
	5 mg	1.5 µg	
	10 mg	1.8 µg	
	20 mg	1.9 µg	
	30 mg	1.9 µg	
	50 mg	1.6 µg	
	100 mg	3.7 µg	
	200 mg	3.2 µg	
	300 mg	3.9 µg	
	500 mg	4.6 µg	
	1 g	2.3 µg	
	2 g	2.5 µg	
	3 g	2.9 µg	
5 g	4.8 µg		

Parameter/Equipment	Range	CMC ^{2,9} (±)	Comments
Mass – Measure (cont)			Master weights
Fixed Points	10 g 20 g 30 g 50 g 100 g 200 g 300 g 500 g 1 kg 2 kg 3 kg 5 kg 10 kg 20 kg	21 µg 16 µg 16 µg 19 µg 50 µg 52 µg 60 µg 0.12 mg 0.84 mg 0.47 mg 1.8 mg 1.0 mg 1.7 mg 8.7 mg	

VIII. Thermodynamics

Parameter/Equipment	Range	CMC ^{2,9} (±)	Comments
Temperature – Measure ³	-196 °C (-80 to 0.01) °C (0.01 to 660) °C (660 to 950) °C	0.013 °C 0.013 °C 0.059 °C 0.35 °C	LN ₂ w/1502 w/ SPRT Bath w/1502 w/ SPRT Bath w/1590 w/ 5624 Bath w/1590 w/ 5624
Temperature – Measure ³	(37.78 to 1315.56) °C	1.6 °C	Fluke 2635A & Type K TC probe (sheath)
Temperature – Measuring Equipment ³	(-196 to 0.01) °C (0.01 to 660) °C (660 to 950) °C	0.013 °C 0.059 °C 0.35 °C	Bath w/1502 w/ SPRT Bath w/1590 w/ 5624 Bath w/1590 w/ 5624
Relative Humidity – Measuring Equipment ³	(10 to 95) % RH	0.51 % RH	Thunder Scientific 2500ST-LT

VIII. Time & Frequency

Parameter/Equipment	Frequency	CMC ^{2,5,9} (\pm)	Comments
Frequency – Measuring Equipment ³	10 MHz	6.7 pHz/Hz	Datum 9390
	0.01 Hz to 2 MHz	2.3 μ Hz/Hz + 5.0 μ Hz	Fluke 5520A
	(0.001 to 1000) Hz 1000 Hz to 20 MHz	0.12 mHz 0.12 nHz/Hz	Datum GPS w/ HP 3325B
	10 MHz to 26.5 GHz	64 pHz/Hz	Datum GPS w/ HP 8340 or 836xA
Frequency – Measure ³	150 kHz to 1.3 GHz Up to 200 MHz 40 Hz to 10 MHz	0.62 μ Hz/Hz + 0.6R 0.060 μ Hz/Hz + 0.6R 120 μ Hz/Hz	HP 8902A HP 5335A Agilent 3458A
	10 MHz (100 to 500) MHz (0.5 to 26.5) GHz	40 pHz/Hz 2.9 nHz/Hz + 0.6R 53 pHz/Hz + 0.6R	Agilent 53132A Agilent 53151A
Optical Tachometers & Stroboscopes	(0.01 to 5) RPM (5 to 200 000) RPM	0.000 58 RPM 0.0012 RPM	Datum GPS w/ HP 3325B, Agilent 53132A

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I. Mechanical

Parameter/Equipment	Range	CMC ^{2,6} (±)	Comments
Pressure – Pneumatic Effective Area of a Piston	(0.2 to 1000) psi (100 to 4000) psi (100 to 14 000) psi (400 to 40 000) psi	0.0040 % 0.0060 % 0.0080 % 0.0080 %	By comparison with Ruska 2465 w/cross float system
Pressure – Hydraulic Effective Area of a Piston	(0.2 to 1000) psi (100 to 4000) psi (100 to 14 000) psi (400 to 40 000) psi	0.0040 % 0.0060 % 0.0080 % 0.0080 %	By comparison with Ruska 2465 w/cross float system
Absolute Pressure ³ – Pneumatic	(0.2 to 25) psia (1.7 to 100) psia (2 to 1000) psia (100 to 4000) psia (100 to 14 000) psia (400 to 40 000) psia (0 to 25) psia (0 to 30) psia (0 to 100) psia (0 to 500) psia (0 to 1000) psia	0.0015 % 0.0015 % 0.0030 % 0.0060 % 0.0080 % 0.0080 % 0.013 % F.S. 0.012 % F.S. 0.013 % F.S. 0.012 % F.S. 0.013 % F.S.	Mensor 5014 Mensor IS50 Mensor 5014 Mensor 5014 Mensor 5014
Gage Pressure ³ – Pneumatic	(0.2 to 25) psig (1.7 to 100) psig (2 to 1000) psig (100 to 4000) psig (100 to 14 000) psig (400 to 40 000) psig (0 to 1500) psig (0 to 250) psig (0 to 200) psig (0 to 100) psig (0 to 60) psig (0 to 50) psig (0 to 25) psig (0 to 15) psig (0 to 3) psig	0.0015 % 0.0015 % 0.0030 % 0.0060 % 0.0080 % 0.0080 % 0.016 % F.S. 0.013 % F.S. 0.013 % F.S. 0.013 % F.S. 0.012 % F.S. 0.012 % F.S. 0.012 % F.S. 0.013 % F.S. 0.012 % F.S.	Ruska 2465 Ruska 2452 w/ 2413 separator Mensor CPC6000 Mensor CPC6000 Mensor 5014 Mensor 5014 Mensor CPC6000 Mensor 5014 Mensor 5014 Mensor 5014 Mensor CPC6000

Parameter/Equipment	Range	CMC ^{2,6} (±)	Comments
Differential Pressure – Pneumatic	(±10) psid	0.015 % F.S.	Mensor 5014
Absolute Pressure ³ – Hydraulic	(0.2 to 25) psia (1.7 to 100) psia (2 to 1000) psia (100 to 4000) psia (100 to 14 000) psia (400 to 40 000) psia (0 to 25) psia (0 to 30) psia (0 to 100) psia (0 to 500) psia (0 to 1000) psia	0.0015 % 0.0015 % 0.0030 % 0.0060 % 0.0080 % 0.0080 % 0.013 % F.S. 0.012 % F.S. 0.013 % F.S. 0.012 % F.S. 0.013 % F.S.	Ruska 2465 Ruska 2452 w/ 2413 separator Mensor 5014 Mensor IS50 Mensor 5014 Mensor 5014 Mensor 5014
Gage Pressure ³ – Hydraulic	(0.2 to 25) psig (1.7 to 100) psig (2 to 1000) psig (100 to 4000) psig (100 to 14 000) psig (400 to 40 000) psig (0 to 200) psig (0 to 100) psig (0 to 50) psig (0 to 25) psig (0 to 15) psig	0.0015 % 0.0015 % 0.0030 % 0.0060 % 0.0080 % 0.0080 % 0.013 % F.S. 0.013 % F.S. 0.012 % F.S. 0.012 % F.S. 0.013 % F.S.	Ruska 2465 Ruska 2452 w/ 2413 Separator Mensor 5014 Mensor 5014 Mensor 5014 Mensor 5014 Mensor 5014
Differential Pressure ³ – Hydraulic	(±10) psid	0.015 % F.S.	Mensor 5014
Accelerometer Sensitivity, Voltage & Charge Sensitivity	(2 to 10) Hz (10 to 50) Hz (50 to 160) Hz (160 to 920) Hz 920 Hz to 5 kHz (5 to 10) kHz	1.4 % 0.80 % 0.70 % 0.80 % 2.1 % 3.3 %	Standard accelerometers

Parameter/Equipment	Range	CMC ^{2,6} (±)	Comments
Vibration – Accelerometer Frequency Response	(0.5 to 10) Hz (> 10 to 99) Hz 100 Hz (> 100 to 920) Hz (> 920 to 5000) Hz (> 5 to 10) kHz (> 10 to 15) kHz (> 15 to 20) kHz	2.2 % 1.7 % 1.3 % 1.4 % 1.7 % 2.2 % 2.8 % 3.5 %	Modal Shop 9155C
Impact Hammer	(0 to 5000) lbf	2.8 %	Modal Shop 9155C hammer calibration system
Shock	Up to 10 000 g	1.9 %	Modal Shop 9525 pneumatic shock exciter
Mass Measure – Fixed Points	(1, 2, 5, 10, 20, 50, 100, 200) mg 500 mg 1 g (2, 5) g 10 g 20 50 g 100 g 200 g 500 g 1 kg 2 kg 5 kg 10 kg 20 kg 50 lb (1 to 500) mg > 500 mg to 5 g (> 5 to 20) g (> 20 to 50) g (> 50 to 100) g (> 100 to 200) g (> 200 to 500) g > 500 g to 1 kg (> 1 to 2) kg (> 2 to 5) kg (> 5 to 10) kg (> 10 to 20) kg 50 lb	0.012 mg 0.013 mg 0.043 mg 0.13 mg 0.13 mg 0.14 mg 0.14 mg 0.22 mg 0.22 mg 0.33 mg 0.33 mg 2.0 mg 2.0 mg 2.5 mg 2.5 mg 3.7 mg 3.7 mg 7.1 mg 7.1 mg 15 mg 15 mg 31 mg 31 mg 59 mg 59 mg 72 mg 0.013 mg 0.13 mg 0.13 mg 0.14 mg 0.14 mg 0.22 mg 0.22 mg 0.33 mg 0.33 mg 2.0 mg 2.0 mg 2.5 mg 2.5 mg 3.7 mg 3.7 mg 7.1 mg 7.1 mg 15 mg 15 mg 31 mg 31 mg 59 mg 59 mg 72 mg	Class 1 weights using comparison method

Parameter/Equipment	Range	CMC ^{2,6,9} (±)	Comments
Torque – Measuring Equipment	(2 to 220) ozf·in (4 to 110) lbf·in (9 to 275) lbf·ft (275 to 2000) lbf·ft	0.043 % 0.044 % 0.050 % 0.044 %	Class F weights w/ torque arms
Force – Measuring Equipment	(0.0 to 1000) lbf	0.01 %	Class S weights

II. Thermodynamics

Parameter/Equipment	Range	CMC ^{2,9} (±)	Comments
Temperature – Measuring Equipment	-196 °C (- 40 to 0.01) °C (0.01 to 660) °C	0.012 °C 0.012 °C 0.059 °C	Hart Scientific 5699, 1590 w/ temperature baths
Temperature – Measure	(-196 to 0.01) °C (0.01 to 660) °C	0.011 °C 0.014 °C	Hart Scientific 5699, 1590

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I. Mechanical

Parameter/Equipment	Range	CMC ^{2,6,9} (±)	Comments
Torque – Measure ³	(5 to 50) lbf·in	0.30 %	CDI 5000ST w/ 4 in 1 transducer model CDI 2000-12-02
	(50 to 250) lbf·in	0.30 %	
	(250 to 1000) lbf·in	0.29 %	
	(25 to 250) lbf·ft	0.30 %	



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I. Dimensional

Parameter/Equipment	Range	CMC ^{2,5} (±)	Comments
Calipers ³	Up to 12 in	(68 + 4.8L) μin	Gage blocks
Indicators ³	Up to 0.5 in Up to 0.5 in	64 μin 33 μin	Universal calibrator Gage blocks
Extrusion Plastometers ³	Up to 2.0 in	1.4 mils	Caliper

II. Mechanical

Parameter/Equipment	Range	CMC ² (±)	Comments
Balances	(1 to 500) mg (0.5 to 5) g (5 to 10) g (10 to 50) g (50 to 100) g (100 to 200) g (200 to 500) g (0.5 to 1) kg (1 to 2) kg (2 to 5) kg	120 μg 130 μg 150 μg 190 μg 320 μg 610 μg 1.8 mg 3.2 mg 6.0 mg 18 mg	Class S weights

III. Thermodynamics

Parameter/Equipment	Range	CMC ^{2,9} (±)	Comments
Temperature – Measure	(-40 to 420) °C	0.13 °C	Instrulab RTD & display unit
Temperature – Measure	(0 to 280) °C	1.3 °C	Altek 322-1 & Type K TC probe
Temperature – Measure	(30 to 300) °C	0.65 °C	Fluke 2635A & Type K TC probe (sheath)

IV. Time & Frequency

Parameter/Equipment	Range	CMC ² (±)	Comments
Timer & Stopwatches	(0 to 300) sec	0.26 s	Stopwatch

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I. Electrical – DC / Low Frequency

Parameter/Equipment	Range	CMC ^{2,4} (±)	Comments
DC Voltage – Generate ³	(0 to 329.999) mV (0.33 to 3.299 99) V (3.3 to 32.9999) V (30 to 329.9999) V (100 to 1000) V	16 µV/V + 0.78 µV 13 µV/V + 1.6 µV 9.4 µV/V + 16 µV 14 µV/V + 0.12 mV 14 µV/V + 1.2 mV	Fluke 5520A
DC Current – Generate ³	(0 to 329.999) µA (0.33 to 3.299 99) mA (3.3 to 32.9999) mA (33 to 329.9999) mA (0.33 to 1.099 99) A (1.1 to 2.9999) A (0 to 10.9999) A (11 to 20.5) A	0.12 mA/A + 16 nA 78 µA/A + 39 nA 78 µA/A + 0.19 µA 78 µA/A + 1.9 µA 0.16 mA/A + 31 µA 0.30 mA/A + 31 µA 0.40 mA/A + 0.39 mA 0.78 mA/A + 0.58 mA	Fluke 5520A
DC Power – Generate ³	0.01 mW to 337 W (0.01 to 3060) W (3060 to 20 910) W	0.18 mW/W 0.17 mW/W 0.57 mW/W	Fluke 5520A

Parameter/Range	Frequency	CMC ^{2,4} (±)	Comments
AC Voltage – Generate ³			
(1 to 32.999) mV	(10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	0.63 μV/mV + 4.7 μV 0.15 μV/mV + 4.7 μV 0.18 μV/mV + 4.7 μV 0.79 μV/mV + 4.7 μV 2.7 μV/mV + 9.3 μV 6.2 μV/mV + 39 μV	Fluke 5520A
(33 to 329.999) mV	(10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	0.24 μV/mV + 6.2 μV 0.12 μV/mV + 6.2 μV 0.13 μV/mV + 6.2 μV 0.28 μV/mV + 6.2 μV 0.63 μV/mV + 25 μV 1.6 μV/mV + 54 μV	
(0.33 to 3.299 99) V	(10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	0.24 mV/V + 39 μV 0.12 mV/V + 47 μV 0.15 mV/V + 47 μV 0.24 mV/V + 39 μV 0.55 mV/V + 97 μV 1.9 mV/V + 0.47 mV	
(3.3 to 32.9999) V	(10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.23 mV/V + 0.50 mV 0.12 mV/V + 0.47 mV 0.20 mV/V + 0.47 mV 0.27 mV/V + 0.47 mV 1.6 mV/V + 1.2 mV	
(33 to 329.999) V	(10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.15 mV/V + 1.6 mV 0.16 mV/V + 4.7 mV 0.20 mV/V + 4.7 mV 0.27 mV/V + 4.7 mV 1.6 mV/V + 39 mV	
(330 to 1020) V	45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.24 mV/V + 7.8 V 0.20 mV/V + 7.8 V 0.24 mV/V + 7.8 V	

Parameter/Range	Frequency	CMC ^{2,9} (±)	Comments
AC Current – Generate ³			Fluke 5520A
(29 to 329.99) µA	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	1.6 mA/A + 78 nA 1.2 mA/A + 78 nA 0.97 mA/A + 78 nA 2.3 mA/A + 0.12 nA 6.2 mA/A + 0.16 nA 12 mA/A + 0.31 µA	
(0.33 to 3.2999) mA	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	1.6 mA/A + 0.12 µA 0.97 mA/A + 0.12 µA 0.78 mA/A + 0.12 µA 1.6 mA/A + 0.16 µA 3.9 mA/A + 0.23 µA 7.8 mA/A + 0.47 µA	
(3.3 to 32.999) mA	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	2.6 mA/A + 1.6 µA 0.70 mA/A + 1.6 µA 0.96 mA/A + 1.6 µA 1.0 mA/A + 1.6 µA 1.9 mA/A + 2.3 µA 3.7 mA/A + 3.1 µA	
(33 to 329.99) mA	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	1.4 mA/A + 16 µA 0.73 mA/A + 16 µA 0.32 mA/A + 16 µA 0.78 mA/A + 39 µA 1.6 mA/A + 78 µA 3.1 mA/A + 0.16 mA	
(0.33 to 1.099 99) A	(10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	1.4 mA/A + 78 µA 0.43 mA/A + 78 µA 4.7 mA/A + 0.78 mA 19 mA/A + 3.9 mA	
(1.1 to 2.999 99) A	(10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	1.4 mA/A + 78 µA 0.47 mA/A + 78 µA 4.7 mA/A + 0.78 mA 19 mA/A + 3.9 mA	
(3 to 10.9999) A	(45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz	0.56 mA/A + 1.6 mA 0.83 mA/A + 1.6 mA 23 mA/A + 1.6 mA	
(11 to 20.5) A	(45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz	0.99 mA/A + 3.9 mA 1.2 mA/A + 3.9 mA 23 mA/A + 3.9 mA	

Parameter/Range	Frequency	CMC ^{2,4} (±)	Comments
AC Power – Generate ³ 33 mV to 1020 V	(45 to 65) Hz, PF = 1 109 μW to 1 mW (1 to 4) mW (4 to 11) mW (11 to 40) mW (40 to 396) mW 396 mW to 11 W (11 to 264) W 264 W to 3 kW (3 to 21) kW	3.4 mW/W 1.4 mW/W 1.1 mW/W 1.3 mW/W 1.0 mW/W 1.0 mW/W 0.94 mW/W 0.98 mW/W 0.81 mW/W	Fluke 5520A

Parameter/Equipment	Range	CMC ² (±)	Comments
Electrical Simulation & Measurement of Thermocouple ³ –			
Type J	(-210 to -100) °C (-100 to -30) °C (-30 to 150) °C (150 to 760) °C (760 to 1200) °C	0.25 °C 0.13 °C 0.12 °C 0.14 °C 0.18 °C	Fluke 5520A
Type K	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 1000) °C (1000 to 1372) °C	0.26 °C 0.14 °C 0.13 °C 0.20 °C 0.31 °C	
Type T	(-250 to -150) °C (-150 to 0) °C (0 to 120) °C (120 to 400) °C	0.50 °C 0.19 °C 0.13 °C 0.11 °C	

II. Mechanical

Parameter/Equipment	Range	CMC ^{2,9} (\pm)	Comments
Pressure – Measuring Equipment ³			
Pneumatic	(0 to 2) psig	0.0012 psig	Fluke PPC4E 15K

¹ This laboratory offers commercial calibration service and field calibration service.

² Calibration and Measurement Capability Uncertainty (CMC) is the smallest uncertainty of measurement that a laboratory can achieve within its scope of accreditation when performing more or less routine calibrations of nearly ideal measurement standards or nearly ideal measuring equipment. CMCs represent expanded uncertainties expressed at approximately the 95 % level of confidence, usually using a coverage factor of $k = 2$. The actual measurement uncertainty of a specific calibration performed by the laboratory may be greater than the CMC uncertainty due to the behavior of the customer's device and to influences from the circumstances of the specific calibration.

³ Field calibration service is available for this calibration. Please note the actual measurement uncertainties achievable on a customer's site can normally be expected to be larger than the CMC uncertainty found on the A2LA Scope. Allowance must be made for aspects such as the environment at the place of calibration and for other possible adverse effects such as those caused by transportation of the calibration equipment. The usual allowance for the actual uncertainty introduced by the item being calibrated, (e.g. resolution) must also be considered and this, on its own, could result in the actual measurement uncertainty achievable on a customer's site being larger than the CMC uncertainty.

⁴ The measurands stated are generated using the indicated instrument (see Comments). This capability is suitable for the calibration of the devices intended to measure the measurand in the ranges indicated. CMC uncertainties are expressed as either a specific value that covers the full range or as a fraction/percentage of the reading plus a fixed floor specification.

⁵ In the statement of CMC, L is the numerical value of the nominal length of the device measured in inches; R is the resolution of the unit under test in inches.

⁶ All CMCs listed in % are percent of reading of input unless otherwise stated.

⁷ In the statement of CMC, percent is expressed as linear error of reported Cal Factor, where the ideal Cal Factor is 100 %. Number given is the CMC of the highest uncertainty test in the frequency range.

⁸ This scope meets A2LA's *P112 Flexible Scope Policy*.

⁹ The type of instrument or material being calibrated is defined by the parameter. This indicates the laboratory is capable of calibrating instruments that measure or generate the values in the ranges indicated for the listed measurement parameter.



Accredited Laboratory

A2LA has accredited

TEKTRONIX, INC.

Cincinnati, OH

for technical competence in the field of

Calibration

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *General requirements for the competence of testing and calibration laboratories*. This laboratory also meets the requirements of ANSI/NCSL Z540-1-1994, ANSI/NCSL Z540.3-2006 and R205 – Specific Requirements: Calibration Laboratory Accreditation Program. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated April 2017).



Presented this 29th of November 2023.

A blue ink signature of Mr. Trace McInturff, written over a horizontal line.

Mr. Trace McInturff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 2357.22
Valid to June 30, 2025

For the calibrations to which this accreditation applies, please refer to the laboratory's Calibration Scope of Accreditation.